॥ श्रद्धाहि परमा गतिः ॥

THE NATIONAL COLLEGE
AUTONOMOUS
JAYANAGAR, BANGALORE-560070
PROCEEDINGS OF BOARD OF STUDIES

Department Of English
An Annual Meeting of the Members of the Board of Studies in English-2019-20
Proceedings of the Annual Meeting of the Board of Studies in English 2019-20

An Annual Meeting of the Board of Studies in English was held by the Department of English on 11th June, 2019 in the Reference Section of the Library, at the National College, Autonomous, Jayanagar, Bangalore -70.

The Following members were present:

1. Smt. Bharati N. Adkoli, Associate Professor, Head, Department of English, and Chair Person , Board of Studies in English, NCJ, Autonomous,Bangalore-70

2. Dr. Chitra Panikkar, Professor, Dept. of English, Bangalore University,Bangalore. [University Nominee]

3. Smt. S. Z. Yasmeen, Dept. Of English, The National College , Autonomous, Basavanagudi, Bangalore-04. [Subject Expert]

4. Smt. Mangala B.U. No. 60, Sri Ram Mandir Road, Basavanagudi, Bangalore-04 [Industrial Representative]

5. Smt. K. N. Sahana, HOD of English, Vijaya Composite P. U. College, III Block, Jayanagar, Bangalore-11. [Esteemed Alumni]

6. Smt. Chinta Vijayalakshmi, Assistant Professor of English, The NCJ, Autonomous, Jayanagar, Bangalore-70 [Staff Member]

7. Ms. S. Varalakshmi, Assistant Professor of English, The NCJ, Autonomous, Jayanagar, Bangalore-70 [Staff Member]

Smt. Reshma N. A.Govt. First Grade College, HSR Lay out, Bangalore-102 and Smt. Chitra V. Assistant Professor of English, The NCJ, Autonous, Jayanagar, Bangalore-70 remained absent to the meeting.

At the outset, Prof. Bharati N. Adkoli, Head, Dept. of English and Chairperson of the Board of Studies in English, extended a hearty welcome to the members present. And then the proceedings of the meeting began with the discussion of the agenda given below:

The proposal

a) to introduce General English New Syllabus with the title ' Professional Communication'-Paper I/II/III/IV(with the CBCS Evaluation Pattern /Scheme)(respectively) for I/II/III/IV BCA (Data Science), BCA(Internet of Things) & B.Sc.(Bio-Medical Electronics), from the Academic year 2019-2020, designed and prepared in coordination with and under the guidance of Dr. Shireen Nedungadi Co-ordinator, PG Dept. of English and Prof. G.B. Kulkarni, former HOD of English, the National College , Autonomous, Basavanagudi, Bangalore-04.

b) to introduce a Mandatory Paper in Communicative English (as per CBCS/UGC guidelines) for III Semester B.Com and IV Semester B.A./B.Sc./BCA from the academic year 2019-2020.

c) to conduct a Short term / Add-On Course on 'English for Competitive Examinations' for all streams.
d) to retain the General English Syllabus of I/I/III/IV Semesters for the academic year2019-20.
e) to retain the Optional English Syllabus of I/II/III/IV/V/VI Semesters for the academic year 2019-2020.
As the members of the BOS were going through the list of Proposals for approval, Prof. Bharati N. Adkoli, explained through elaboration about the General English New Syllabus, being introduced at the Undergraduate level for the New Programs from the academic year-2019-20. She further highlighted that the New Syllabus focuses on the objectives in order to prepare the learners, to meet the requirements of the Industry. Prof. Bharati further added that the New Syllabus aims at developing Skills in Communicative English (Spoken and Written), Functional English and literary component has been eliminated. All the external members of the BOS approved the title proposed to the New Programs and appreciated the aptness of the title. Speaking about the Evaluation Pattern/Scheme, Prof. Bharati, clarified that the New Programs too will have the CBCS Evaluation Pattern/Scheme as-Theory-40 marks+ Practical -30 marks and Internal Assessment -30 marks for all the four Semesters. All the external members of the BOS were convinced of the logic in introducing Functional English and opined that the Syllabus prescribed will familiarize the students with the technical aspects of the language that will enable them to acquire proficiency in professional communication. Dr.Chitra Panikkar asked if the study material is being supplied to the learners. To which, Prof. Bharati, the Chair person, replied that a list of books has been appended along with the Syllabus Copy for the reference of the teachers and the learners and the respective, required Course material/ the sources are available in the library. Dr. Chitra Panikkar suggested to have consolidated 'Course objectives and separate individual 'Outcomes' for all the four semesters. Prof. Bharati agreed to incorporate the given suggestion. Dr. Chitra Panikkar again asked ' If the Department has any Language Lab, Prof. Bharati gave the details that the Language Lab, established in 2010-2011, is being upgraded with an advanced software suitable to meet the requirements of the syllabus and the students.
During the discussion at some point, Prof. S.Z. Yasmeen raised a question for clarification why Communicative English, is being introduced as a Mandatory Paper in the III & IV semester as these students will have this paper in V & VI semesters. In response to Prof. Yasmeen's question, Prof . Bharati said that following the CBCS and the autonomous guidelines, 'Communicative English' was introduced as a mandatory paper for the outgoing students across the streams, as per the UGC guidelines, all the courses shall comprise of the papers related to the respective core subjects in the last two semesters and 'Communicative English' should be given as a mandatory paper for I-IV semesters across streams. Prof. Bharati summed up that, in concurrence with the BOS 'Communicative English ' will be a part of the curriculum as a mandatory paper for III &V semester B. Com. in the Odd Semester and for IV&VI Semesters in the Even Semester respectively during the academic year 2019-2020. The proposal in this regard made by Prof. ABN was approved by the external members of the BOS. Prof. Yasmeen further asked if III & IV semester students study common General English Texts across streams, to which Prof. Bharati said that in cocurrence with the BOS , Department of English has resolved to retain the same Syllabus as before for the academic year 2019-20.
At this point, Prof. Sahana K. N. HOD of English, Vijaya Composite P.U. College , Jayanagar, Bangalore-11, asked about the strength for Optional English subject and Prof. ABN said, " It is ideal, though it is relatively lesser than that of General English and only those students with passion/aptitude for literatue will opt for it.". Then, Prof Mangala B. U. an Industrial representative on the BOS asked for the Optional English Syllabus of all semesters and she wanted to know if any changes are made in the current academic year, a copy of the Optional

English Syllabus of all semesters was passed on to her and Prof. ABN said that for the academic year-2019-20 no changes have been made as in 2018-19 itself required additions and omissions are done. Smt. Mangala B.U. showed interest to know about the methodologies to teach prescribed drama texts to the learners from diverse backgrounds. Reacting to her queries related to the methodology, Prof. Vijayalakshmi and Prof. S. Varalakshmi explained that diverse strategies and methodologies would be adopted in keeping with the requirements of the learners. They added that sometimes there would be a need to use local language to teach the English Language. Incidentally, Smt. Mangala made a remark in the light of her experienced observation about the need to acquire flawless command over the English Language to make a mark in the most competitive world of Industry. Dr. Chitra Panikkar also shared her experience and observation about the attitude of the students in the classroom at the PG level and expressed her regret about the indifference and lack of interest on the part of the students for reading and writing. All the members of the BOS voiced the same opinion with regret about the changing trend towards reading and writing and attributed it to the diversion caused by the advent of the influence of Technology.

In the concluding part of the BOS Meeting, Prof. Bharati requested the esteemed external members for their suggestions and recommendations regarding the relevant changes to be made in General English and Optional English Syllabus. Dr. Chitra Panikkar proposed that Basic Phonetics could be introduced and along with the History of the English Language, 'Shaping and Building Words'-Etymology could be added in Optional English Syllabus. Prof. Bharati expressed her gratitude to Dr. Chitra Panikkar and all the members of the BOS for having made the Annual Meeting of the BOS very meaningful and interesting with their gracious presence, by contributing their valuable suggestions and agreed to incorporate the recommended suggestions/additions at the time of revising and restructuring the syllabus in the respective Optional English Syllabus.

All the members of the BOS unanimously approved the list of the Members of the Board of Examiners as mentioned below for the Academic year2019-20:

2. Prof. Reshma, N.A. Dept.of English, Govt. First Grade College, 14th 'A' cross, Sector –I, HSR Lay Out, Bangalore-102.

3. Prof. Sahana K. N., Head, Dept. of English, Vijaya Composite P. U. College, 3rd block , Jayanagar, Bangalore-11.

Prof. Bharati N. Adkoli, summed up the resolutions regarding the Proposed a)prescribed Syllabus for the New Programs at the Undergraduate level and b)Communicative English –a Mandatory Paper for III&IV semesters from the academic year 2019-20.

All the members of the BOS approved wholeheartedly the proposal---

a) to introduce General English New Syllabus with the title ' Professional Communication' -Paper I/II/III/IV(with the CBCS Evaluation Pattern /Scheme)(respectively) for I/II/III/IV BCA (Data Science), BCA(Internet of Things) & B.Sc.(Bio-Medical Electronics), from the Academic year 2019-2020, designed and prepared in coordination with and under the guidance of Dr. Shireen Nedungadi Co-ordinator, PG Dept. of English and Prof. G.B. Kulkarni, former HOD of English, the National College , Autonomous, Basavanagudi, Bangalore-04.

b) to introduce a Mandatory Paper in Communicative English (as per CBCS/UGC guidelines) for III Semester B.Com and iv Semester B.A./B.Sc./BCA from the academic year 2019-2020.

c) to conduct a Short term / Add-On Course on 'English for Competitive Examinations' for all streams.

All the External Members of the Board of Studies in English have given their consent-----

a) to retain the General English Syllabus of I/I/III/IV Semesters for the academic year2019-20.

b) to retain the Optional English Syllabus of I/II/III/IV/V/VI Semesters for the academic year 2019-2020.

Prof. Vijayalakshmi, a member of the Dept. of English extended Vote of Thanks at the end of the meeting.
(Prof. Bharati Narayan Adkoli)

THE NATIONAL COLLEGE
AUTONOMOUS
JAYANAGAR, BANGALORE-560070
Department of English

Annual Meeting of the Board of Studies-2019-2020.

Department of English has conducted the Annual meeting of the BOS for the AcademicYear2019-20. All the members of the BOS have given their approval-

a) to introduce General English New Syllabus with the title ' Professional Communication' -Paper I/II/III/IV(with the CBCS Evaluation Pattern /Scheme)(respectively) for I/II/III/IV BCA (Data Science), BCA(Internet of Things) & B.Sc.(Bio-Medical Electronics), from the Academic year 2019-2020, designed and prepared in coordination with and under the guidance of Dr. Shireen Nedungadi CO-Ordinator, PG Dept. of English and Prof. G.B. Kulkarni, former HOD of English, the National College , Autonomous, Basavanagudi, Bangalore-04.

b) to introduce a Mandatory Paper in Communicative English (as per CBCS/UGC guidelines) for III Semester B.Com and iv Semester B.A./B.Sc./BCA from the academic year 2019-2020.

c) to conduct a Short term / Add-On Course on 'English for Competitive Examinations' for all streams.

d) to retain the General English Syllabus of I/I/III/IV Semesters for the academic year2019-20.

e) to retain the Optional English Syllabus of I/II/III/IV/V/VI Semesters for the academic year 2019-2020.

(Prof. Bharati Narayan Adkoli)
Prof. Bharati Narayan Adkoli
Prof. Bharati Narayan Adkoli
Prof. Bharati Narayan Adkoli
Prof. Bharati Narayan Adkoli
Prof. Bharati Narayan Adkoli

ಕನ್ನಡ ಅಧ್ಯಯನ ಮಂಡಲಿ ಸಭೆಯ ತೀರ್ಮಾನಗಳು

ದಿನಾಂಕ:10.06.2019ರಂದು ಬೆಳಿಗ್ಗೆ 11:30ಕ್ಕೆ ಕಾಲೇಜಿನ ಬೋರ್ಡ್ ರೂಮ್‌ನಲ್ಲಿ ವಿಭಾಗದ ಮುಖ್ಯಸ್ಥರ ಅಧ್ಯಕ್ಷತೆಯಲ್ಲಿ ನಡೆದ ಕನ್ನಡ ಅಧ್ಯಯನ ಮಂಡಲಿ ಸಭೆಯ ತೀರ್ಮಾನಗಳು:-

1. 3 ಮತ್ತು 4ನೆಯ ಸೆಮಿಸ್ಟರ್ ಬಿ.ಎ/ಬಿ.ಎಸ್.ಸಿ/ಬಿ.ಸಿ.ಎ/ಬಿ.ಕಾಂ. ತರಗತಿಗಳ ಪಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಸಭೆಯಲ್ಲಿ ಸುದೀರ್ಘವಾಗಿ ಚರ್ಚಿಸಲಾಯಿತು. ಪ್ರಸ್ತುತ ಚಾಲ್ತಿಯಲ್ಲಿರುವ ಪಠ್ಯಕ್ರಮವು ಮೂರನೆಯ ವರ್ಷಕ್ಕೂ ಮುಂದುವರಿಸಲು ಸಭೆ ಒಪ್ಪಿಗೆ ನೀಡಿತು.
2. 3 ಮತ್ತು 4ನೆಯ ಸೆಮಿಸ್ಟರ್ ಬಿ.ಎ. ಐಚ್ಛಿಕ ಕನ್ನಡ ಪಠ್ಯಗಳನ್ನು ಪ್ರಸಕ್ತ ವರ್ಷವು ಕೂಡ ಮುಂದುವರಿಸಿ 2020ರಲ್ಲಿ ನಡೆಯಲಿರುವ ಅಧ್ಯಯನ ಮಂಡಲಿ ಸಭೆಯಲ್ಲಿ ಬದಲಾಯಿಸಿ ನೂತನ ಪಠ್ಯವನ್ನು ಅಳವಡಿಸಿಕೊಳ್ಳಲು ಸಭೆ ಒಪ್ಪಿಗೆ ನೀಡಿತು.
3. ನೂತನವಾಗಿ ಪ್ರಾರಂಭವಾಗಿರುವ ಬಿ.ಎಸ್.ಸಿ(Bio Medical , Electronics and B.C.A.- IOT and Data Science) ತರಗತಿಗಳಿಗೆ ಪ್ರಸ್ತುತ ಬಿ.ಸಿ.ಎ ತರಗತಿಗಳಿಗೆ ನಿಗದಿ ಮಾಡಿರುವ ಪಠ್ಯವನ್ನೇ ಅಳವಡಿಸಿಕೊಳ್ಳಲು ಸಭೆ ತೀರ್ಮಾನಿಸಿತು.

ಸಭೆಯಲ್ಲಿ ಹಾಜರಿದ್ದ ವಿದ್ವಾಂಸರು:-

1. ಡಾ.ಕೆ.ವಿ. ನಾರಾಯಣಾಚಾರ್ಯ - ಅಧ್ಯಕ್ಷರು.
2. ಡಾ. ಎಂ. ಲೀಲಾವತಿ - ವಿದ್ವಾಂಸರು. 10.6.19
3. ಡಾ. ವಿ.ಬಿ. ಹೊನ್ನುಸಿದ್ಧಯ್ಯ - ವಿಶ್ವವಿದ್ಯಾಲಯ ಪ್ರತಿನಿಧಿ.
4. ಶ್ರೀ. ಮುಳಲಗಿದ. - ವಿದ್ವಾಂಸರು.
5. ಶ್ರೀ. ಎಸ್. ಎಸ್. ಉಪಾಧ್ಯಾಯ - ಮಾಧ್ಯಮ ಪ್ರತಿನಿಧಿ.
6. ಡಾ. ನಾಗಪ್ಪ ಕಿಲಾರಿ - ಹಿರಿಯ ವಿದ್ವಾಂಸರು. 10.6.19
7. ಡಾ. ಬಿ. ಮಾದಪ್ಪ - ವಿದ್ವಾಂಸರು.
8. ಡಾ. ವಿ. ನೆಲಿತ - ವಿದ್ವಾಂಸರು. V

THE NATIONAL COLLEGE
Autonomous
Jayanagar, Bangalore- 560 070

DEPARTMENT OF HINDI

Proceedings of the meeting

The meeting of U.G. Board of Studies in Hindi was held on **04.06.2019 at 11 a.m** in the **Board Room** to frame the syllabus and prescribe the text books for U.G. I and II Semester B.A/B.Sc/B.C.A/B.Com (Semester Scheme CBCS) for the year 2019-20 and 2020-21

MEMBERS PRESENT

Sl. No	Name and Address	Signature
1	Dr.Shekhar Professor &HOD of Hindi Bangalore University, Jnan Bharathi Bangalore-560056	University Nominee 4/6/19
2	Prof. Govinde Gowda #217 Shakthi Nilaya, 8th cross Telecom Layout, Bhuveneshwari Nagar, Opp to Gopalan Residency Bangalore-560023.	Subject Expert 04/06/2019
3	Dr.Mohammed Anzaul Haaq Associate Proffessor Sheshadripuram Evening Degree College Sheshadripuram, Bangalore-560020	Subject Expert 04/06/19
4	Dr.Manjula.S.N Associate Professor VHD Autonomous Home Science College Palace Road,Bangalore-560001	Subject Expert 4/6/2019
5	Sri Umesh Joshi Rajasthan Patrika Bangalore.	Media Person
6	Dr. Asha R Chauhan Asst. Prof. of Hindi The National Degree College, Jayanagar, Bangalore- 560 070	Chair Person 04 June'19

THE NATIONAL COLLEGE
AUTONOMOUS
JAYANAGAR, BANGALORE 560 070

DEPARTMENT OF HINDI

Proceedings of the meeting of Board of Studies

1. The Department of Hindi conducted the Board of studies on 04.06.2019 at 11 am at Board Room regarding the discussion of the following Agenda.

a) Framing the Syllabus for I and II Semester for the years 2019-2020, 2020-21 for B.A/B.Sc/B.Com & B.C.A

b) Pattern of question papers for the said courses.

2. Five members were invited to the B.O.S meeting, One of whom is a Nominee of the University, One from Autonomous College, One representing Govt. Degree College, One from Aided Degree College, One from Print Media, One representing Alumnus (meritorious)
3. After a detailed discussion Syllabus for I and II Semester for the year 2019-20 and 2020-21 were finalized.
4. Question paper patterns for the above courses were framed after discussion.
5. The scheme of valuation was approved.
6. For paper setting and Valuation work the names of following external members were approved.

a) Prof. Mohd. Alzaul Haak - Sheshadripuram Degree College, Evening Sheshadripuram Bangalore

b) Dr. Manjual -VHD Autonomous Home Science College Palace Road Bangalore.

7. General Scheme of Valuation is given below:

a) Written Examination - 70
b) Internal Assessment - 30
100

New Syllabus CBCS Pattern (Theory -70 Marks and Internal Assessment - 30 Marks Total -100)

Break –up for Internal Assessment

1. **Tests - 20**
2. **Assessment - 05**
3. **Attendance - 05**

30

THE NATIONAL COLLLEGE

AUTONOMOUS

NAAC ACCREDIATED 'A' GRADE

JAYANAGAR -560070

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BOARD OF STUDIES MEETING

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DEPARTMENT OF SANSKRIT

MAY/JUNE 2019

THE NATIONAL COLLEGE
AUTONOMOUS
Jayanagar, Bangalore – 560 070

BOARD OF STUDIES
DEPARTMENT OF SANSKRIT

PROCEEDINGS

1. The department of Sanskrit conducted the board of studies (BOS) meeting on 29./.05./2019 at 12:30 am at The National Degree College (Autonomous) Jayanagar, Bangalore 560070, with the agenda detailed in Appendix 1.
2. Three members were invited to the meeting, one of whom is University Nominee. They are subject experts; one is an old student of National College, Jayanagar. Their names and designation are detailed in Appendix2
3. After a detailed discussion the syllabus of I/II/III/IV semesters of B.A./B.Sc./B.Com./B.C.A. Course was finalized. Shown here as Appendixes 3.1, 3.2, 3.3 and 3.4.
4. Similarly the question paper pattern of the said courses were also finalized, Shown here as Appendixes 4.1, 4.2, 4.3 and 4.4.
5. The general scheme of Evaluation as per college Rules, is provided In Appendix 5.
6. The signature of the members in approval of the details of items 4 and 5 above is shown here in Appendix 6.

Enclosure: Appendixes 1-8

Dr. M. Sathish Karanth
Chairman, BOS,
29/05/2019

Head of The Department of Sanskrit
The National College, Autonomous
7th Block Jayanagar, Bangalore-70

APPENDIX 1

AGENDA

1. Forming the syllabus of Language Sanskrit for B.A./B.Sc./B.Com./B.CA. Course, Semester I/II/III/IV, for the academic year 2019-2020.
2. Deciding the Question Paper Pattern for the Examination of the said Courses.

APPENDIX 2

Members of the B O S

Chair Person	Dr. M. Sathish Karanth Head, Dept of Sanskrit, The National Degree college (Autonomous) Jayanagar , Bangalore-560070
University Nominee	Dr.C.Shivraju Professor, H.O.D. Of Sanskrit, Bangalore University , Bangalore-560056
Subject Experts	Dr. H. Venkateshappa H.O.D. of Sanskrit, Govt. Arts College, Bangalore-560001
	Prof. S.N. Pranesh Professor, H.O.D. Of Sanskrit, Dept. of Sanskrit, Jain College, Vasavi Temple road Bangalore-560004
Faculty Members Present	Dr. M. Sathish Karanth, H.O.D. & Associate Professor in Sanskrit, The National Degree College (Autonomous), Jayanagar , Bangalore-70
Alumnus	

APPENDIX 3

SYLLABUS

APPENDIX 3.1

Syllabus: Semester 1 (B.A./B.Sc./B.Com./B.C.A.)

1. Paper Description	Poetry (Detailed Text), Translation and Composition. poetry, Mahakavya Lakshana
2. Text Prescribed	14th Canto of Raghuvamsa of Kalidasa
3. Reference Books	Raghuvamsa of Kalidasa by C. Ramanathan, Subhas Publication. Raghuvamsa of Kalidasa by M. R. Kale, Motilal Banarasi Das. Raghuvamsa of Kalidasa.History of Sanskrit literature.,

APPENDIX 3.2

Syllabus: Semester 2 (B.A./B.Sc./B.Com./B.C.A.)

1. Paper Description	Prose (Detailed Text), Translation and Composition.Prose
2. Text Prescribed	Kadambari of Bana
3. Reference Books	Kadambari of Bana by M. K. Surya Narayana Rao, Subhas Publication. Kadambari of Bana. Bannaje Govinda Acharya (Kannada Translation).

APPENDIX 3.3

Syllabus: Semester 3 (B.A./B.Sc./B.Com./B.C.A.)

1. Paper Description	Drama (Detailed Text), Translation and Composition.
2. Text Prescribed	Swapnavasavadattam of Bhasa (1-3 Acts)
3. Reference Books	Swapnavasavadattam of Bhasa by M.K. Surya Narayana Rao, Subhas Publication Bangalore. Swapnavasavadattam of Bhasa C.P.K. Swapnavasavadattam of Bhasa –M.R. Kale.

APPENDIX 3.4

Syllabus: Semester 4 (B.A./B.Sc./B.Com./B.C.A.)

1. Paper Description	Drama (Detailed Text), Translation and Composition.
2. Text Prescribed	Swapnavasavadattam of Bhasa (4-6 Acts)
3. Reference Books	Swapnavasavadattam of Bhasa by M.K. Surya Narayana Rao, Subhas Publication Bangalore. Swapnavasavadattam of Bhasa C.P.K. Swapnavasavadattam of Bhasa –M.R. Kale.

APPENDIX 4
QUESTION PAPER PATTERN
APPENDIX 4.1
Question Paper Pattern: Semester 1 (B.A./B.Sc./B.Com./B.C.A.)

I. Detailed Text	
- Essay	10 each x 2 (of 4) – 20
- Short Notes	05 each x 3 (of 5) – 15
- Sloka – Translation and Explanation	05 each x 3 (of 5) – 15
- Annotations (in Kannada or English)	05 each x 2 (of 4) – 10
II. Translation or Comprehension	
- Translation (of Unseen Passage) from Sanskrit to Kannada/English	
- Translation (of Unseen Passage) from Kannada/English to Sanskrit	
- Comprehension	10

APPENDIX 4.2
Question Paper Pattern: Semester 2 (B.A./B.Sc./B.Com./B.C.A.)

I. Detailed Text	
- Essay	10 each x 2 (of 4) – 20
- Short Notes	05 each x 3 (of 5) – 15
- Prose – Translation and Explanation	05 each x 3 (of 5) – 15
- Annotations (in Kannada or English)	each x 2 (of 4) – 10
II. Translation or Comprehension	
- Translation (of Unseen Passage) from Sanskrit to Kannada/English	
- Translation (of Unseen Passage) from Kannada/English to Sanskrit	
- Comprehension	10

APPENDIX 4.3

Question Paper Pattern: Semester 3 (B.A./B.Sc./B.Com./B.C.A.)

I. Detailed Text	
- Essay	10 each x 2 (of 4) – 20
- Short Notes	05 each x 3 (of 5) – 15
- Sloka – Translation and Explanation	05 each x 3 (of 5) – 15
- Annotations (in Kannada or English)	05 each x 4(of 5) – 20
II. Translation or Comprehension	
- Translation (of Unseen Passage) from Sanskrit to Kannada/English	
- Translation (of Unseen Passage) from Kannada/English to Sanskrit	
- Comprehension	10

APPENDIX 4.4

Question Paper Pattern: Semester 4 (B.A./B.Sc./B.Com./B.C.A.)

I. Detailed Text	
- Essay	10 each x 2 (of 4) – 20
- Short Notes	05 each x 3 (of 5) – 15
- Sloka – Translation and Explanation	05 each x 3 (of 5) – 15
- Annotations (in Kannada or English)	05 each x 4 (of 5) – 20
II. Translation or Comprehension	
- Translation (of Unseen Passage) from Sanskrit to Kannada/English	
- Translation (of Unseen Passage) from Kannada/English to Sanskrit	
- Comprehension	10

GENERAL SCHEME OF VALUATION

I. Breakup of total marks	
(a) - Written Examination I/II (B.A./B.Sc./B.Com./B.C.A.)	70
- Internal Examination I/II (B.A./B.Sc./B.Com./B.C.A.)	30
Total	100
(b) - Written Examination III/IV (B.A./B.Sc./B.Com./B.C.A.)	80
- Internal Examination III/IV (B.A./B.Sc./B.Com./B.C.A.)	20
Total	**100**
II. Breakup of Internal Assessment	
(a) Tests	10 x 02 = 20
(b) Attendance	05
(c) Assignment	05
Total	**30**

APPENDIX 6

APPROVAL OF THE MEMBERS OF B.O.S.

Of the Syllabus

1.	Dr. M. Sathish Karanth	29/5/19
2.	Dr.C.Shivraju	29/5/19
3.	Dr. H. Venkateshappa	29/5/19
4.	Prof. S.N Pranesh	29/5/19
5.	Alumnus	29/5/19.

THE NATIONAL COLLEGE

AUTONOMOUS

JAYANAGAR,BANGALORE-560070

THE PROCEEDINGS OF THE BOARD OF STUDIES OF THE DEPARTMENT OF HISTORY FOR THE YEAR 2019-20 FOR B.A. COURSE HELD AT THE BOARD ROOM AT 11.00 A.M. ON 30TH OF MAY 2019.

MEMBERS PRESENT

1.	**Prof.Dr.Shaik Masthan N.** Professor,Dept. of History Bangalore University, Jnana Bharathi, Bangalore-560056	**University Nominee**	30/5/2019
2.	**Prof.Dr.Shadaksharaiah** Professor,#11,2nd Main 3rd Cross Vidyagiri Layout,Nagarabhavi, Bangalore-560072	**Subject Expert**	30/5/19
3.	**Prof.Dr.Usha Devi M.V.** Professor, Dept. of History Bangalore University,Jnana Bharathi, Bangalore-560056	**Subject Expert**	— A —
4.	**Mr.Karthikeyan S.** Jungle Lodges and Resorts Pvt.Ltd KSTDC Govt. of Karnataka ,Khanija Bhavan Bangalore-560001	**Industry Representative**	
5.	**Kum.Sanjana C.P.** No.73,19th Main,14th Cross Padmanabhanagar Bangalore-560070	**Student Representative**	CP 30/05/19.
6.	**Dr.B.R.Parineetha** Associate Professor Dept. of History National College Jayanagar,Bangalore-560070	**Principal**	
7.	**Prof.Sunil Kumar V.** Assistant Professor Dept. of History National College Jayanagar,Bangalore-560070	**Head of the Department**	V.

PROCEEDINGS OF THE BOARD OF STUDIES HELD ON 30TH MAY 2019 AT 11.A.M. IN THE BOARD ROOM, NATIONAL COLLEGE, JAYANAGAR,BANGALORE.

1. The Chairperson extended a warm welcome to all the members and placed the agenda before the Board.
2. The Board looked into the details of syllabus of the third and fourth semesters of B.A. course.
3. The members suggested few changes in the existing syllabus and prepared the revised syllabus with modifications.
4. The Board has approved the panel of Examiners for the year 2019-20.

THE NATIONAL COLLEGE
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PROCEEDINGS OF BOS IN ECONOMICS

The meeting of the **Board of Studies in Economics** was held on **17th June 2019** at **11:00am** in the **B.V.J Science Centre**, Head of the Department of Economics Dr. Nagachampa jain welcomed the esteemed members of the board to the meeting.

MEMBRES PRESENT:

1. Prof. Ramanjaneyulu
2. Dr. Padmini Rao
3. Dr.H.R Krishna Murthy
4. Sri. C.S Sudheer
5. Prof. Parijatha
6. Dr. Nagachampa Jain
7. Prof. Vijay .K

MEMBRES ABSENT:

1. Dr. Abdul Aziz

RESOLUTIONS:

1. The Board has reviewed the working and progress of different semesters of B.A. and B.Com course and expressed their satisfaction.
2. The Board has discussed and finalized the syllabus for III and IV semesters of B.A course.

3. Dr. Padmini Rao suggested the inclusion of Problems facing NBFCs in the 5th module of the Monetary Economics paper for III semester B.A and Correlation analysis and Regression analysis in the 3rd - module of IV semester B.A. Economics paper.

4. Prof. Ramanjaneyulu suggested the inclusion of Measures of inequality in the 3rd - module of IV Semester B.A Economics paper.

5. Mr.Sudheer suggested the inclusion of Regulatory challenges for NBFCs in the 5th -module of III B.A. Monetary Economics paper.

6. The Board suggested to retain the old pattern (i.e 2 marks , 5 marks and 15 marks for III semester B.A.,2 marks, 5 marks, and 10 marks for IV semester B.A) of question paper.

7. The Board has recommended the following panels of external examiners to the Board of Examiners:

    1. Dr. H.R.Krishna Murthy
    2. Prof. Balakrishna
    3. Prof. Sheela Jayanth
    4. Prof. V. Srinivasan
    5. Prof. Premalatha
    6. Prof. Pushpa N
    7. Dr. Prathima

8. The Board has decided to review the working and progress of different semesters from time to time.

At the end, Dr.Nagachampa Jain, Head of the Department of Economics proposed the vote of thanks to all the members present in the meeting.

AGENDA
DATE 17/06/2019

B.O.S. MEETING IN ECONOMICS

MEMBERS PRESENT

01 Prof. Ramanjaneyalu - M. Ramanjaneyalu

02 Dr. Padmini Rao - Padmini Rao

03. Sri. CS Sudhir -

04. Prof. Parisatha - S. Parisatha

05. Dr. H.R. Krishna Murthy - H.R. Krishna Murthy

06. Dr. Nagachampa Jain - Nagachampa Jain

07. Prof. Vijay. K -

Members Absent

1. Dr. Abdul Aziz.

THE NATIONAL COLLEGE
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DEPARTMENT OF SOCIOLOGY

PROCEEDINGS OF THE BOARD OF STUDIES MEETING IN SOCIOLOGY HELD ON 08-06-2019

The Board met on 08-06-2019 to discuss the agenda mentioned below. The Chairman extended a warm welcome to all the members of the Board.

AGENDA:

1. To finalise the papers to be taught under the new system from semester III to IV.
2. To finalise and approve the syllabi for semester III and IV to be introduced for the year 2019-20 under C.B.C.S. Scheme.
3. To approve the list of members of BOE for the year 2019-20.
4. To approve the panel of external examiners.
5. To finalise question paper pattern to be implemented.
6. To introduce Add-on Course.

The Board met at 11.00 AM in the IQAC Board Room, National college, Jayanagar and discussed the agenda threadbear. All the members of the Board were present and took active participation and gave valuable suggestions.

The Chairman of the Board presented a scheme of papers to be taught in B.A. Course from semester I to VI. The Board looked into the details of syllabus of III and IV Semesters B.A.Course. After a thorough discussion the Board has approved the following titles for semesters I to VI:

Semester	Paper	Title of the paper
I Semester B.A.	Sociology Paper I	Introduction to Sociology
II Semester B.A.	Sociology Paper II	General Sociology
III Semester B.A.	Sociology Paper III	Sociology of Indian Society
IV Semester B.A.	Sociology Paper IV	Sociology of Indian Society
V Semester B.A. Compulsory paper	Sociology Paper V	Social problems-with reference to India
V Semester B.A. Elective 1	Sociology Paper VI 'A'	Industrial Sociology
Elective 2	Sociology Paper VI 'B'	Sociology of Rural development
VI Semester B.A. Compulsory Paper	Sociology Paper VII	Methods and Techniques of Social Research

VI Semester B.A. Elective 1	Sociology Paper VIII 'A'	Sociology of gender
Elective 2	Sociology Paper VIII 'B'	Sociology of Education
III BA,Bcom,BSc., BCA	Interdisciplinary Paper	Social Research
IV BA,Bcom,BSc., BCA	Interdisciplinary Paper	Sociology of mass media & communication
All Stream	Add on Course	Culture,Diversity And Society
All Stream	Add-On Course	Social Demography

The Chairman of B.O.S. presented the papers titled Sociology of Indian Society-Paper III for III Semester B.A.Course and Sociology of Indian Society-Paper IV for IV Semester B.A.Course, which were discussed at length and Dr.C.Somashekher, University nominee, Prof.Vasanthi, Prof.Anitha and the other members suggested some changes in the syllabi which were accepted and included.

The Board members resolved to include major religions in Unit I, to include one more unit Marriage in India, Issues in family in Unit III and types of village community in Unit V for III Semester B.A. syllabus.

They suggested to include Theoretical concepts of Caste as Unit II, Types of social movements in Unit IV and rise of inclusivist movement in Unit V for IV Semester B.A.Syllabus.

They suggested Social Demography as Add-On course and finalized the syllabus and approved the Interdisciplinary paper syllabus for III and IV Semester BA,Bcom,BSc and BCA Course for Non- sociology students.

Finally, the Board approved the syllabi of III and IV semesters to be implemented from the academic year 2019-20.

* The copy of the approved syllabi is enclosed herewith.

The Board also discussed the members to be included in the B.O.E. for the year 2019-20 and it approved the list of members for the year 2019-20.

1. H.O.D. of Sociology	NCJ	Chairperson, B.O.E.
2. Faculty member	NCJ	Member
3. External members	-	To be selected from the Panel of examiners.

The Board also approved the panel of external examiners which included Professors from various colleges affiliated to Bangalore University. The approved list of panel members included:

1. Dr. Mallika T.S	Hasnath college, Bengaluru.
2. Prof.Vasanthi.K	B.N.M. College, Banashankari.
3. Prof.Anitha	M.E.S.College, Malleshwaram.
4. Prof.Poulin Edwin	N.M.K.R.V.College, Bengaluru.
5. Prof.Uma	M.L.A. College, Malleshwaram.
6.Dr.Krishne Gowda	The National College, Basavanagudi.

The Board also discussed the question paper pattern which consisted of 70 marks theory and 30 marks for internal assessment. The split up marks would be as follows:

1. 05 Marks Questions	-	5x4 = 20
2. 10 Marks Questions	-	10x2 = 20
3. 15 Marks Questions	-	15x2 = 30
		70

Two tests for 10 Marks each	-	2x10 = 20
Assignments, field work etc.	-	1x05 = 05
Attendance	-	- 05
		30

At the end Chairman thanked the members of the Board.

Enclosures: 1. Copy of the syllabus of III semester & IV semester B.A.

2. Copy of the syllabus of Add-on Course.
3. Copy of the signature of B.O.S. members.
4. Copy of the panel of B.O.E. members.

The National College
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Department of Sociology

The Board of members who were present in BOS Meeting in Sociology, which was held on 8th June 2019 in IQAC Board Room at 11.00 A.M.

Name	Signature
1. Dr.C.Somashekher University Nominee Department of Sociology Bangalore University Bengaluru-560 056	08/6/19
2. Prof.Vasanthi.K HOD of Sociology B.N.M. College Banashankari Bengaluru	Vasanthi K 8/6/19
3. Prof.Anitha.K HOD of Sociology M.E.S College Malleshwaram Bengaluru	Anitha.K. 8/6/19
4. Prof.Saraswathi.R Chairman HOD of Sociology The National College Jayanagar Bengaluru-560 070	8/6/19
5. Prof.Pratheeksha.B The National College, Jayanagar Bengaluru-560 070	B.Pratheeksha 8/6/19

6. Hema.M Alumni The National College Jayanagar Bengaluru-560 070	Hema.M 8/6/19
7. Uday Industrial Representative Digi Caption Company Bengaluru	8/6/19

THE NATIONAL COLLEGE

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DEPARTMENT OF PSYCHOLOGY

PROCEEDINGS OF THE BOARD OF STUDIES MEETING HELD ON 14TH MAY 2019

The members present :

1.Prof.Stella Ananthia
Chairperson
HOD Department of Psychology
The National College, Jayanagar

2. Dr. Uma Hirisave
Subject Expert
Professor of Child Psychology
NIMHANS, Bangalore.

3.Dr.Gopalakrishna
University Nominee
Professor, Department of Psychology
Bangalore University,
Bangalore.

4.Dr.M.J.Sridhar
Industry Representative
Managing Director,
ERMG Consultant,
Bangalore.

5.Prof.Jayanthi
Subject Expert
Associate Professor,
Rajiv Gandhi Institute of Chest Diseases
Bangalore.

6.Prof.Harshitha.R
Alumnus
NMKRV College for Women,
Bangalore.

The Chairperson of the Board of Studies in Psychology, Prof. Stella Ananthia extended a warm welcome to the members.

She presented the Proposed Syllabus of Developmental Psychology papers prescribed for BA, III and IV Semesters. The Course Description and Outcome was appreciated and approved by all the members. The title of a topic in the first unit, Introduction to Developmental Psychology was changed. The topic on the Human development today was changed to Current trends in Human development. No changes were suggested for the other four units. The members were impressed with the wide coverage of the relevant topics, but were also in awe as to how they could be covered within the stipulated time. However, they were convinced by the novel and innovative methods pursued by the Department such as PPT, use of Smart board, Seminars and Paper presentations by students.

The Experiments for the Practicals were approved. One experiment in the IV Semester was changed. Slight changes were made in the Statistics to be taught for both the III and IV Semesters. Project Work was also changed, so as to be in sync with the Theory Paper. About 20% changes were suggested by external board members.

In the IV Semester syllabus, one subtopic - Education and Work was added in the 2nd Unit on Early Adulthood. The members suggested few changes in the Unit- Middle Adulthood. Occupational patterns in Middle Age, Midlife crisis were added and two topics were deleted. In the second part of the Unit - Late Adulthood, the topic on Patterns of grieving was taken off. Around 20% changes were made in keeping up with the present times and studies. The question paper pattern will be retained both for theory and practicals.The syllabi for Inter Disciplinary Course in Psychology for III and IV Semesters also remains the same.

The changes were approved by all the members. The Chairperson thanked the members for attending the meeting. She also thanked them for their active participation and continued support.

Stella Ananthia
14/5/2019

BOS MEETING IN PSYCHOLOGY HELD ON 14TH MAY 2019

1. Prof.Jayanthi
   Subject Expert

2. Dr.Gopalakrishna
   University Nominee

3. Dr.M.J.Sridhar
   Industry Representative

4. Dr. Uma Hirisave
   Subject Expert

5. Prof.Harshitha.R
   Alumnus

6. Prof.Stella Ananthia
   Chairperson

THE NATIONAL COLLEGE

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Jayanagar, Bangalore – 560 070.

DEPARTMENT OF JOURNALISM

Proceedings of the Board of Studies Meeting
for the Academic Year 2019-2020 held on 18th June 2019

The Board of Studies in Journalism, The National College (Autonomous), Jayanagar, Bangalore – 560 070, met at the Board Room of our college at 09.30 a.m. The following members were present at the meeting:

1) Dr. B.K. Ravi, (Subject Expert)
   University Nominee, Professor, Department of Communication
   (Present Registrar) Bangalore University, Bangalore – 56t0 009.

2) Sri P. Thyagaraj,
   Media Representative, Sr. Journalist,
   Executive Editor, Vishwavani,
   Bangalore. CEO of Digital Kannada – Online portal.

3) Dr. S. Jayasimha,
   Chairman, Head of the Department, Department of Journalism,
   The National College, Jayanagar, Bangalore-560 070.

4) Prof. K. Prashanth,
   Department of Journalism,
   The National College, Jayanagar, Bangalore-560 070.

5) Sri Rahul Dev,Alumnus/ Student Representative.

Dr. S. Jayasimha, extended a warm welcome to the members of the Board of Studies and briefed the activities of the department. After the formal introduction of the Board of members to each other, the agenda of the meeting as mentioned below was discussed in detail.

1) The Syllabus of all the six semesters, prescribed for B.A. course, for the academic year 2019-20.
   - After the elaborate discussions the board approved the syllabus and suggested to incorporate certain changes. All the suggested changes were included in the syllabus.

2) Board appreciated the introduction of special paper "Submission of the Project" in VI semester (Practical/Lab - Paper 8: 50 Marks) and suggested to continue.

3) According to the CBCS syllabus, the Department would be offering Two Inter-Disciplinary Papers of :
   (1) Reporting Skills
   (2) Interview Techniques and
   (3) PR and Image Building.

   The Subject expert and BU Nominee gave valuable suggestions with regard to Inter-Disciplinary Papers and the same were accepted and incorporated.

4) The Board discussed the pattern of the question papers and suggested the existing pattern to the academic year 2019-20.

5) The Board also discussed about the members to be included in BOE for the academic year 2018-19 and approved the following list of members:
   (1) Dr. S. Jayasimha, Head of the Department of Journalism. NCJ.
   (2) Prof. K. Prashanth, Department of Journalism, NCJ.
   (4) Prospective Staff Members.
   (5) Sri P. Thyagaraj, Sr. Journalist, Executive Editor, Vishwavani, Bangalore.
   (6) Sri B.J. Ramachandra Rao, Senior Journalist, Kannada Prabha, Bangalore.
   (7) Prof. Vijay Kanchikal, Department of Journalism, Govt. First Grade College, KR Puram, Bangalore.
   (8) Prof. Mahesh, Department of Journalism, Govt. Arts & Science College, Bangalore-1.
   (9) Any Professor/Lecturer of Journalism or Working Journalist.

The Board felt the need of introducing more practicals and organising Guest Lectures on various Journalistic topics including 'On-line Journalism', Translations skills and Feature writing. The same was duly noted by Head of the Department.

The Board also approved to conduct Add-0n courses in Journalistic topics for the interested students.

The National College, Autonomous, Jayanagar, Bangalore – 560 070

DEPARTMENT OF JOURNALISM

MEETING OF BOARD OF STUDIES

The Meeting of Board of Studies was held on 18th June, 2019 at 09.45 a.m. to update the existing syllabus of B.A. Journalism course.

MEMBERS PRESENT

	Name	Signature
1.	University Nominee and Subject Expert Dr. B.K. RAVI University Nominee, Professor of Journalism, Registrar, Bangalore University, Bangalore.	18/6/2019
2.	Representative from Media Sri P. THYAGARAJ Sr. Journalist, Banalore.	18/6/19
3.	Chairperson Dr. S. JAYASIMHA Head of the Department, Department of Journalism, The National College, Jayanagar, Bangalore – 560 070.	18/6
5.	Faculty Member Prof. K. PRASHANTH Lecturer, Dept. of Journalism, The National College, Jayanagar, Bangalore – 560 070.	18/6/19
6.	Sri RAHUL DEV Students Representative.	18/06/19

Head, Dept. of Journalism
THE NATIONAL COLLEGE
7th Block, Jayanagar,
Bangalore - 560 070.

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DEPARTMENT OF PHYSICS (UG)

Meeting of the B.O.S. in Physics (UG) held on 24th May 2019

Members	Signature
Chairman **Prof. H. Pundareeka Bhatta** Associate Professor & Head, Department of Physics The National College, Jayanagar, Bangalore-560 070.	24/5/2019
University nominee **Dr. Rudraswamy B** Professor, Department of Physics Bangalore University, Bangalore-560 056.	24/5/19
Subject Experts **Prof H.S. Sudheendra** Associate Professor, Department of Physics Govt. Science College, Nrupathunga Road, Bangalore-560001	24/5/19
Dr. Samartha Channagiri Post Doctoral Researcher, Advanced Facility for Microscopy and Microanalysis, IISc, Bangalore-560012	

Industry Representative

Sri J Anilkumar

Kamaljeeth Instrumentation and Service Unit,

610, 5th main,8th cross, JRD Tata Nagar, Bangalore -560 092.

Meritorious Alumnus

Dr. S.M. Sriraghavan

Co-Founder and President Academics, Number Nagar,

Bangalore.

Member

Prof. K.S. Nethravathi

Assistant Professor, Department of Physics (UG)

The National College, Jayanagar, Bangalore-560 070.

Proceedings of the Meeting of the B.O.S in Physics (UG) held on 24-05-2019 at 11 am in the Board Room, The National College, Jayanagar, Bangalore-70

- **The Members present**

1. Prof.H.Pundareeka Bhatta
2. Dr.B.Rudraswamy
3. Prof H.S. Sudheendra
4. Dr. Samartha Channagiri
5. Sri J Anilkumar
6. Dr. S.M. Sriraghavan
7. Prof. K.S. Nethravathi

- At the outset the chairman of the Board of Studies and the H.O.D of Physics, Prof H.Pundareeka Bhatta extended a warm welcome to the members present.
- The proposed syllabi for III and IV Sem B.Sc both in theory and practical were discussed in detail.
- The distribution of the topics in theory paper PHY301 and practical paper PHY302 for III Sem B.Sc and that in theory paper PHY401 and practical paper PHY402 for IV Sem B.Sc, the scheme of instruction and pattern of examination under CBCS scheme were finalized.
- It was decided to retain the inter-disciplinary paper **PHYSICS AND OUR SOCIETY: PHY401- ID2** for IV Semester.
- It was decided to adopt some innovative methods of teaching that would benefit the students in better way of learning the subject.
- The members gave the approval for the constitution of Board of Examiners in Physics for the year 2019-20 consisting of the following members:

(i) Prof. H.S.Sudheendra, Government Science College, Bangalore-01.
(ii) Prof. Ramesh Babu.K.R., Government Science College, Bangalore-01.
(iii) Prof .B.V Narendra, Dayanaanda Sagar College of Arts, Science and Commerce, Bangalore-78.
(iv) Prof. H.C.Bellad, Government Science College, K R Puram, Bangalore.
(v) Dr. D.Gopala Krishna, The National College, Basavanagudi, Bangalore-04.
(vi) Dr. Y.C Kamala, The National College, Basavanagudi, Bangalore-04.
(vii) Prof. B.V.Sreedhara Swamy, The National College, Basavanagudi, Bangalore-04.

(viii) Prof.C.G.Badrinath, Kongadiyappa College of Arts, Science and Commerce, Doddaballapura.

(ix) Prof.Mohamed Saleem, The National College, Basavanagudi, Bangalore-04.

(x) Prof.G.Lokesh, Associate professor, NMKRV College, Jayanagar, Bangalore.

(xi) Prof.G.Gunavati, Associate professor, NMKRV College, Jayanagar, Bangalore.

- It was decided to introduce 24 hours Add-On course in **Renewable Energy and Energy Harvesting**.
- The chairman thanked the members for their active participation and valuable suggestions.

24/5/2019

Head of the Dept. of Physics
The National College
Jayanagar, Bangalore-560 082

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THE NATIONAL COLLEGE

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Department of Chemistry

Proceedings of the meeting of Board of Studies in Chemistry held on 12th June 201

The chairman extended a hearty welcome to the members of the Board and placed the following agenda for discussion.

1. Scrutiny and approval of draft syllabus for III and IV semester B.Sc. Chemistry.
2. Pattern of Question papers

The Rules and regulations of examination and promotion of students were explained in detail to the members.

The members discussed the syllabus of III and IV semesters, theory as well as practical. The Syllabus which was drafted in one of the earlier meetings, keeping in view of CBCS and Bangalore University syllabus (Which is scheduled to be implemented from the academic year 2019-20) and syllabus circulated by UGC, was thoroughly examined. After incorporating modifications suggested by the members, the Board approved the syllabus for III and IV semesters.

The pattern of the question papers for all semesters is for 150 Marks, Theory 70 Marks, Internal assessment 30 Marks, Practical 50 Marks, Practical Examination 35 Marks and for Practical Internal assessment 15 Marks.

The theory question paper contains two Parts :- Part –A and Part B.

Part-A would carry 12 questions of 2 marks each. The students should answer any 8 questions. (8X2=16 Marks)

Part – B would carry 13 questions of 6 marks each. The Students should answer any 9 questions. (9X6=54 Marks)

The chairman express heartful thanks to the members for their active participation, fruitful discussion and valuable guidance.

12/6/19

HOD and Chairman

HOD of Chemistry
The National College
Autonomous
Jayanagar 7th Block,
Bangalore - 560 070

12.06.2019

List of Members of Board is enclosed

(5)(3)

2019-20

THE NATIONAL COLLEGE

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BOARD OF STUDIES
DEPARTMENT OF CHEMISTRY

Members present at the meeting of Board of Studies in Chemistry held on 12.06.2019 to discuss and approve the syllabus for B.Sc. III & IV semesters.

Sl. No.	Name and Address	Signature
1	**Dr. Vishnu Kamath P.** Prof. of Inorganic Chemistry Bangalore University. Central College, Bangalore – 1.	
2	**M.N. Yogananda , M.Tech.,** Environmental Officer Kanrnataka State Pollution control Board #49, Parisara Bhavana Church street Bangalore – 1.	
3	**Dr. Nagalakshmi B.N.** Associate Professor and Head Maharani Lakshmi Ammanni College for Women (Autonomous) Malleshwaram, Bangalore -12.	
4	**Sagar N.R. (Alumini)** Research Scholar, Dept. of Chemistry Central College campus, Bangalore University, Bangalore – 1.	
5	**Mallesh H.B.** Associate Professor & Head Dept of Chemistry The National College Jayanagar, Bangalore – 70	12/6/19
6	**Lakshmi A.N.** Assistant Professor , Dept.of Chemistry The National College, Jayanagar Bangalore - 70	12/6/19

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DEPARTMENT OF MATHEMATICS

Proceeding of the Meeting of B.O.S in Mathematics held on 12.06.2019 at 11 AM at **The National College**, Jayanagar, Bangalore – 70

MEMBERS PRESENT :

1. Dr.H G Nagaraja
   Chairman and Professor,
   Dept. of Mathematics,
   Bangalore University.

2. Dr.Medha Itagi,
   Professor of Mathematics,
   Dept. of Mathematics,
   Bangalore University.

3. Sri. B.S.Sudarshan , M.E.,
   Industrialist.

4. Smt. N.Lakshmi, M.Sc,
   Alumnus of our college.

5. Sri. H G.Amaraprabhu,
   Assistant Professor. & H.O.D.

6. Smt. N.R.Latha,
   Assistant Professor.

7. Smt. M. Indira Bai,
   Assistant Professor.

1. The Chairman extended a warm welcome to all the members.
2. The syllabi of Mathematics subject of B.Sc. course incorporating 'Practical' using FOSS (Free and Open Source Software) tools was introduced in year 2014-2015 by this Board. In this BOS the members decided to change some of the topics for II B.Sc. course. The structure of B.Sc. Mathematics papers approved by the Board is attached herewith. The new format of the question papers (70 Marks) for Third and Fourth semester B.Sc.(2019-20onwards) was discussed and approved.
3. The members discussed and finalized the list of members for the Board of Examiners for B.Sc., B.C.A, B.Com. Mathematics/ Statistics papers. Following is the Board of Examination for this academic year.
    1. Prof. H. G. Amaraprabhu (H.O.D)
    2. Prof. N.R. Latha
    3. Prof. M.Indira Bai.

    External Members

    1. Prof. Sundaramma. P
    2. Prof. Vittal V. Kulkarni.
    3. Prof. I.C. Ballur
    4. Prof.Radhakrishna. D
    5. Prof.Sathyanarayana.
    6. Prof.Keshavan. K
    7. Prof.Aarathi
    8. Prof.Sheeba

4. Finally, the Chairman thanked the members and the members reciprocated the same to the Chairman.

THE NATIONAL COLLEGE

AUTONOMOUS
JAYANAGARA, BENGALURU-70

DEPARTMENT OF ELECTRONICS

Meeting of the Board of studies
Held on 30th May 2019

SL NO	NAME	DESIGNATION	SIGNATURE
1	**CHELUVAPPA.S.** Associate Professor and H.O.D of Electronics The National College Jayanagar, Bengaluru-70	Chairman	
2	**MAHADEVA.M** Associate Professor Department of Electronics The National College Jayanagar, Bengaluru-70	Faculty Member	
3	**Dr. B.Rudra swamy** Professor Department of Physics J.B. Campus Bangalore University, Bengaluru	University Nominee	
4	**Dr. MANJESH** Associate Professor Department of Electronic Science J.B. Campus, Bangalore University, Bengaluru	Subject Expert	
5	**Dr.R. Rashmi** M.R Prof Department of Electronics Amrutha School of Engineering. Amrutha Visvhavidyapetam,Bengaluru.	Subject Expert	
6	**Sri Sripadaraj.** MEMS Technical Consultant IntelliSense Software Pvt Ltd Bengaluru-560076	Industry Representative	
7	Sri Goutham Anand Research Assistant IISc Bangalore	Alumni Representative	

A meeting of the B.O.S was held in the department of Electronics, The National Degree College, Jayanagara on **Saturday 30th may 2019** at 11 AM. Sri. Cheluvappa S , H.O.D of Electronics, The National College Jayanagara welcomed the members. He read the proceedings of the last meeting of the Board of studies held on 9th June 2018. He presented the revised draft syllabus for the Third and Fourth semesters of Autonomous Electronics Course from 2019-2020 onwards.

The following were the contents of Third and Fourth semester B.Sc Electronics syllabus

Third Semester

Paper 301 – Operational Amplifier and Special Semiconductor Device
Paper 302 – Analog Electronics Lab

Fourth Semester

Paper 401 – 8085 Microprocessor and Electronic Instrumentation
Paper 402 – 8085 microprocessor Lab

Interdisciplinary Course in Electronics

Third Semester

PAPER IDEL 301: Discover Electronics

Fourth Semester

PAPER IDEL 401: Electronic Gadgets

1. The draft Syllabus was Scrutinized.
2. Dr Rashmi suggested including voltage sensing using Op Amp
3. Dr. Manjesh Suggested including Special Power Electronic Devices like Power MOSFET and IGBT in the third semester syllabus.
4. Dr. Manjesh Suggested including SCR characteristics in the Analog Electronics Lab.
5. Sensors are Included in the Fourth Semester Syllabus.
6. The Syllabus of Interdisciplinary papers were discussed.
7. Suggested changes were incorporated in the syllabus.
8. The syllabus was approved.
9. The BOS also decided to approve The Board of Examiners (BOE) panel for the academic year 2018-19.
10. Chairman finally thanked the members for their co-operation.

Date: 30-5-2019

CHELUVAPPA .S
H.O.D OF ELECTRONICS
THE NATIONAL COLLEGE
JAYANAGARA, BENGALURU -70

The National College – Autonomous
Jayanagar, Bangalore - 70

DEPARTMENT OF COMMERCE

Proceedings of the B.Com BOS in Commerce held on 30th May 2019 at 03.30 p.m. at The National College, Jayanagar, Bangalore – 70.

Members Present:

1.	Sri. Arun Kumar G S	Chairman
2.	Dr. Sarvamangala R	Coordinator – Dept. of Commerce University Representative
3.	Dr. Satyapal Sharma N K	HOD of Commerce– V V N College –Bangalore Subject Expert
4.	Dr. Muralidhara S	HOD of Commerce– Govt. FGC–Vemagal Cross University Representative
5.	Satish Narayan	ACCA – Hewlett Packard - Industry Representative
6.	Prof. Koushik D R	Dept of Commerce – Noble Business School Meritorious Alumni
7.	Smt. Deepa Venkatesh	Assistant Professor – Member
8.	Smt. Sowmyashree	Assistant Professor – Member
9.	Smt. Nagamani P L	Assistant Professor – Member
10.	Kum. Janaki P V	Assistant Professor – Member
11.	Smt. Chaitra M	Assistant Professor – Member

The Chairman welcomed all the members to the meeting.

1) The previous BOS of 14th June 2018 was thoroughly reviewed and discussed. The changes were incorporated and the Chairman explained the changes.

DEPARTMENT OF COMMERCE

2) The Board discussed and scrutinized regulations & scheme under CBCS.

3) The Board reviewed and resolved to approve the pattern of examination question paper as mentioned in the Regulation and Scheme of Study.

4) A) The University Representative Dr. Sarvamangala insisted in having five core subjects in III & IV semesters in par with the B.Com Course Matrix of Bangalore University & the board resolved to approve the change in the course matrix.

B) The Board Members strongly recommended to have computer based commerce additional subject for the II year B.Com. Accordingly, it discussed and resolved to approve "Accounting Information System" in III semester & "Accounting for Business Applications" in IV semester as additional core subjects (theory cum practical paper).

5) From the academic year 2018 onwards, a new subject is proposed with title "Financial Derivates and Risk Management" replacing the subject titled "Stock and Commodity Markets" keeping in view its objectives and global relevance in IV semester.

6) The Chairman readout the syllabus of newly introduced subject titled "Financial Derivates and Risk Management" and the board discussed and resolved to approve the syllabus.

7) The Board discussed and resolved to approve the change in the subject of "Insurance" with "Principles of Banking and Insurance".

8) From the academic year 2018 onwards, The Board discussed and resolved to approve Summer Internship Programme for the students in view of its importance in the competitive job market. The Programme could enable the students to gain exposure and personal experience in the field they choose.

9) The Board resolved to approve for continuation of the same inter disciplinary paper for III semester non – commerce students. However, it resolved to approve the subject (along with the syllabus) "Principles of Banking" instead of "Principles of Insurance" for IV semester non – commerce students.

DEPARTMENT OF COMMERCE

10) As per the statute of Autonomous, the External Board of Examiners (BOE) should be constituted in the BOS meeting with the consent of the members of the BOS. The list of external BOE was read out and shown by the Chairman of BOS for selection and approval. The Board resolved to approve eight members from the panel of BOE.

11) The Board members strongly recommended starting of any specialized or integrated B.Com course and also recommended for any good certificate add on courses like E-Filing, Research Methodology, Supply Chain Management, Big Data and Competitive Market Positioning, Leadership course, Business Development Training etc.

12) Finally, the Chairman thanked the members and the members reciprocated the same to him.

(ARUNKUMAR G S)
CHAIRMAN – BOARD OF STUDIES

SIGNED IN THE PRESENCE OF
CHAIRMAN - BOS

1. ..... 2. .....
3. ..... 4. .....
5. ..... 6. .....
7. ..... 8. .....
9. ..... 10. .....

The National Education Society of Karnataka®

THE NATIONAL COLLEGE

36th B cross, 7th block, Jayanagar, Bangalore-70
(Autonomous Institution, Affiliated to Bangalore University)

DEPARTMENT OF COMPUTER SCIENCE

Bachelor Of Computer Application (Data Science)

B.O.S Meeting - 29th March 2019

PROGRAM OUTCOMES (PO):

BCA(Data Science) graduate will be able to

PO1: Develop in-depth understanding of key technologies in Data science and business analytics , data mining, machine learning, visualization techniques, and statistics

PO2:Practical problem analysis and decision making.

Po3: Gain practical hands-on experience with statistics, programming language and big data tools through coursework.

Po4: To empower students with tools and techniques for handling ,managing analysing and interpreting data.

PROGRAM SPECIFIC OUTCOME (PSO)

PSO1: Students shall be exposed to managing large data by learning fundamental theory in Mathematics, Statistics and Database management.

PSO2:Students will also get hands on experience in using tools like Excel and Tableau to apply the theoretical fundamentals of statistics in practical applications.

PSO3: students learn analysis and design of algorithms, understanding and using unstructured data, extraction and usage of large datasets. They shall learn the prediction methods through fundamentals of machine learning

PSO4: On teaching students to apply the skills learnt in the first 4 semesters in practical applications through building r applications using machine learning

DEPARTMENT OF COMPUTER SCIENCE

Proceedings of the B.o.S Meeting of B.C.A(Data Science) held on 29th March 2019 from 11.00 a.m. at The National College,Jayanagar Bangalore – 70.

The Board approved the following for the BCA(Data Science) course.

1. Introducing the course "Data Structure Using Python or R" and Corresponding lab in II semester.
2. Introducing the course "Operating System" and Operating System Lab in III Semester.
3. Introducing " Computer Networks" and Computer Networks Lab in IV Semester.
4. Replacing the course "Application of Data Science" with "Theory of Computation " in V Semester.
5. Removing Module 3 in the course " Natural Language Processing" in V Semester.

THE NATIONAL COLLEGE

AUTONOMOUS

Jayanagar, Bangalore - 560 070.

Website : www.nationalcollegejayanagar.org E-mail : ncjblore@yahoo.com

NAAC ACCREDITED 'A' GRADE

॥ श्रद्धाहि परमा गतिः ॥

DEPARTMENT OF COMPUTER SCIENCE

Ref. : ..... Date .....

Attendance list of the BOS members present on 29th March 2019 for B.C.A(Data Science)

Sl.No	Members Name	Address	Signature
1.	**Prof. Shalini.C** Chairperson	Associate Prof.& HOD of Computer Science The National College Jayanagar, Bangalore - 70	
2	**Dr. Muralidhara.B.L** University Nominee	Professor, & Coordinator, MCA Programme Bangalore University	29-03-2019
3	**Dr. Parmeshwar Pandit** Subject Expert	Professor Dept. of Statistics Bangalore University	
4	**Prof.Dinesh** Subject Expert	Professor, IIIT, Bangalore	
5	**Mr. Balu Masti** Subject Expert	Academician and Consultant	
6	**Mr. Sreenath B H** Industrial Representative	Entrepreneur	
7.	**Mr. Phanibhusan V Sharma** Alumni	Chief Coordinator, Education, Research and Technology ,N.E.S And Entrepreneur	
8.	**Dr. Madura** K.R Member	Coordinator-PG Mathematics The National College ,Jayanagar	
9.	**Prof. Amarprabhu** Member	Asst. Professor, Dept. of Mathematics The National College ,Jayanagar	
10.	**Prof. Varada Raj** .R Member	Assistant Professor The National College ,Jayanagar	
11.	**Prof. Manjula S** Member	Assistant Professor The National College ,Jayanagar	Manjula .S

THE NATIONAL COLLEGE

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Jayanagar, Bangalore - 560 070.

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DEPARTMENT OF COMPUTER SCIENCE

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Date .....

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29th March 2019 for B.C.A(I.o.T)

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1.	**Prof. Shalini.C** Chairperson	Associate Prof.& HOD of Computer Science The National College Jayanagar, Bangalore - 70	
2	**Dr. Muralidhara.B.L** University Nominee	Professor, & Coordinator, MCA Programme Bangalore University	29-03-2019
3	**Dr. Manjesh** Subject Expert	Associate Professor, Dept. of Electronics Science Bangalore University	
4	**Dr. Renuka Prasad. B** Subject Expert	Assistant Professor Dept. of MCA RVCE.	B. Renuka Prasad
5	**Mr. Shivapradsad** Industrial Representative	Senior Product Manager GE	
6	**Mr. Vijay Mysore** Alumni Representative	Entrepreneur	
7.	**Dr. Madura** K.R Member	Coordinator-PG Mathematics The National College ,Jayanagar	
8.	**Prof. Amarprabhu** Member	Asst. Professor, Dept. of Mathematics The National College ,Jayanagar	
09.	**Prof.Cheluppa S** Member	Assoc. Prof.,Dept. of Electronics The National College ,Jayanagar	
10.	**Prof. Mahadeva** Member	Assoc. Prof., Dept. of Electronics The National College ,Jayanagar	M. Mahadeva
11.	**Prof. Varada Raj**. R. Member	Assistant Professor The National College ,Jayanagar	
12.	**Prof. Manjula S** Member	Assistant Professor The National College ,Jayanagar	Manjula.S

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DEPARTMENT OF COMPUTER SCIENCE

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NAAC ACCREDITED 'A' GRADE

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DEPARTMENT OF COMPUTER SCIENCE

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11.	**Prof. Manjula S** Member	Assistant Professor The National College ,Jayanagar	Manjula.S

THE NATIONAL COLLEGE JAYANAGAR, BANGALORE-70

BACHELOR OF COMPUTER APPLICATION (Data Science)

COURSE MATRIX

I SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	Title		IA	Exam	Total	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)1.1	Mathematics-I	4	30	70	100	4
	B(DS)1.2	Statistics-I	4	30	70	100	4
	B(DS)1.3	Computer Organization & Architecture	4	30	70	100	4
	B(DS)1.4	Programming in C	4	30	70	100	4
	L1.1	Programming in C Lab	3	15	35	50	1
	L1.2	Mathematics – I and Statistics - I Lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	50	1
		Total Marks and credits	**31**	**225**	**525**	**750**	**23**

II SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)2.1	Mathematics-II	4	30	70	100	4
	B(DS)2.2	Statistics-II	4	30	70	100	4
	B(DS)2.3	Data Structures	4	30	70	100	4
	B(DS)2.4	RDBMS- MySQL	4	30	70	100	5
	L2.1	Data Structures Lab	3	15	35	50	1
	L2.2	Mathematics – II and Statistics - II Lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	50	1
		Total Marks and credits	**31**	**225**	**525**	**750**	**24**

III SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)3.1	Statistical Inference	4	30	70	100	4
	B(DS)3.2	Analysis and Design of Algorithms	4	30	70	100	4
	B(DS)3.3	Python	4	30	70	100	4
	L3.1	Statistics for Data Science (SAS/SPSS) Lab	3	15	35	50	1
	L3.2	Python Lab	3	15	35	50	1
	L3.3	Analysis and Design of Algorithms LAB	3	15	35	50	1
Part 3		Open Elective	2	15	35	50	1
		Total Marks and credits	**31**	**210**	**490**	**700**	**20**

IV SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)4.1	Machine Learning - I	4	30	70	100	4
	B(DS)4.2	Data Mining	4	30	70	100	4
	B(DS)4.3	Web Technologies	4	30	70	100	4
	L4.1	Tableaux (Data Visualization)	3	15	35	50	1
	L4.2	Machine Learning Lab	3	15	35	50	1
	L4.3	Web Technologies Lab	3	15	35	50	1
Part 3		Open ELECTIVE	2	15	35	50	1
		Total Marks and credits	**31**	**210**	**490**	**700**	**20**

V SEMESTER							
Part	Paper		Hours/week	Marks			Credit
	Code	Title		IA	Exam	Total	
Part 2	B(DS)5.1	Machine Learning - II	4	30	70	100	4
	B(DS)5.2	Natural Language Processing	4	30	70	100	5
	B(DS)5.3	Cloud Computing	4	30	70	100	5
	B(DS)5.4	Big Data Analytics	4	30	70	100	4
	B(DS)5.5	Applications of Data Science	4	30	70	100	5
	L5.1	Machine LearningLab	3	15	35	50	1
	L5.2	Big Data Analytics Lab	3	15	35	50	1
	L5.3	Mini Project	6	30	70	100	2
Total Marks and credits			**32**	**210**	**490**	**700**	**27**

VI SEMESTER							
Part	Paper		Hours/week	Marks			Credit
	Code	Title		IA	Exam	Total	
Project/Internship			32	210	490	700	24
Total Marks and credits			**32**	**210**	**490**	**700**	**24**

All Six Semester Matrix

Semester	Hours/week	Marks			Credit
		IA	Exam	Total	
First	31	225	525	750	24
Second	31	225	525	750	24
Third	31	210	490	700	20
Fourth	31	210	490	700	20
Fifth	32	210	490	700	27
Sixth	32	210	490	700	24
Total Marks and Credits				**4300**	**139**

SEMESTER I

I SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	Title		IA	Exam	Total	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)1.1	Mathematics-I	4	30	70	100	4
	B(DS)1.2	Statistics-I	4	30	70	100	4
	B(DS)1.3	Computer Organization & Architecture	4	30	70	100	4
	B(DS)1.4	Programming in C	4	30	70	100	4
	L1.1	Programming in C Lab	3	15	35	50	1
	L1.2	Mathematics – I and Statistics - I Lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	70	1
Total Marks and credits			**31**	**225**	**525**	**750**	**24**

TITLE: MATHEMATICS-I

PAPER CODE: B(DS)1.1	CREDITS : 4	TOTAL NO OF HRS: 52

Objectives:

On completion of the course, the student will be able to

- ✓ Analyze and understand big and small numbers and their different forms of representation that relate to business. Comprehend algebraic solutions to simple mathematical and business problems.
- ✓ Solve linear and quadratic equations using multiple methods.
- ✓ Understand information organized in row and column format (matrix), and use algebraic methods to interpret them. Elementary processed in differentiation and appreciate the need for continuous and discrete functions as needed in Business and Management.

MODULE 1	**Number Systems** Introduction to numbers, Integers, Rational numbers, Irrational numbers, Real numbers, Imaginary numbers, Complex numbers, Prime numbers, Algorithm to test if a number is prime. LCM, HCF, Divisibility criteria, Expression of a number as a product of its prime factors, Perfect squares and perfect cubes – Surds, Conjugate surds, Rationalization of surds. Number systems – Binary, Octal, Hexadecimal representation, Change of base, Conversion from one base to the other, Computer representation, Scientific notation.	**06 hrs**
MODULE 2	**Vectors** Vectors, Adding and subtracting of vectors, scalar and dot product of vectors, gradient of a vector,distance between two vectors,sum of the squares and magnitude of vectors.	**06 hrs**
MODULE 3	**Linear Algebra** Algebra of powers – Indices, Logarithms, Factorials, Law of indices. Polynomials, Roots of polynomials, Descartes rule of sign, Quadratic equations, Tracing quadratics. Ratio and proportions, Binomial theorem, Use of nCr, nPr, Maximum value of nCr, Symmetric nature of binomial coefficients.	**10 hrs**
MODULE 4	**Matrices** Matrices – Nomenclature, Matrix operations – Addition, Subtraction, Multiplication, Inversion. Types of matrices, Characteristics equation of a square matrix, Cayley – Hamilton theorem. Determinants – Evaluation of a determinant, Identical rows and columns, Properties of determinants.	**10 hrs**

TITLE: Statistics-I		
PAPER CODE:	**CREDITS :**	**TOTAL NO OF HRS: 52**

Objectives of the course are:

- ✓ This paper will help students to have a thorough knowledge of descriptive statistics.
- ✓ To understand measures of central tendency and use them to analyze data.
- ✓ Students will be able to find out how spread out data values are on number line.

MODULE 1	**Introduction** Population and sample, Types of data – Qualitative, Quantitative, Univariate, Multivariate, Cross sectional, Time, Series, Discrete, Continuous, Primary, Secondary, Scales of measurement – Nominal, Ordinal, Interval, Ratio, Variables and attributes, Organization and presentation of data, Construction of frequency distributions (univariate and bivariate), Presentation of data through diagrams (bar and pie) and graphs (frequency curve, histogram, cumulative frequency curves), Stem and leaf plot.	**18 hrs**
MODULE 2	**Measures of Central Tendency** Measures of location or central tendency – Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean – Properties, Positional averages or quartiles – Quartiles, Deciles and Percentiles	**7 hrs**
MODULE 3	**Measures of Dispersion** Measures of dispersion – Absolute measures – Range, Mean deviation, Quartile deviation, Standard deviation – Statement of properties, Coefficient of variation, Skewness and Kurtosis – Concept and measures. Discussions on the suitability of the different measures in practical situations	**7 hrs**
MODULE 4	**Correlation and Regression** Linear correlation – Scatter diagram, Product moment correlation coefficient – Properties, Spearman's rank correlation coefficient, Simple regression, Prediction.	**20 hrs**

TITLE: Computer Organization and Architecture		
PAPER CODE:	**CREDITS :**	**TOTAL NO OF HRS: 52**

Objectives:

On completion of the course, the student will be able to

- ✓ To conceptualize the basics of organizational and architectural of a digital computer.
- ✓ Be familiar with the history and development of modern computers. Be familiar with Number System and Boolean algebra.
- ✓ Be familiar with Combinational and logic circuits. Be familiar with organization and design of modern computer and its architecture.
- ✓ Be familiar with I/O organization and Memory organization

MODULE 1	**Number System and Boolean algebra** Binary, octal, Hexadecimal Number systems, base conversions, signed binary numbers, binary arithmetic, subtraction using compliments, Binary codes, weighted-BCD-8421 code, Gray code, excess-3 code, ASCII code.	**8hrs**
MODULE 2	**Boolean algebra and logic gates:** Boolean laws, Demorgen's theorems, Minimization of Boolean expressions-using Boolean postulates and Karnaugh maps technique(sop). AND, OR, NOT gate using Transistor NAND, NOR as universal gates : X-OR,X-NOR gates	**8hrs**
MODULE 3	**Combinational and logic circuits:** Half adder, half subtractor, full adder, full subtractor, Multiplexer ,De-multiplexer, Encoder, Decoder, Flip-Flops: JK, T, D master slave JK flip flops Shift registers: SISO, SIPO, PISO, PIPO (block diagrams), and 4-bit SISO shift register using D-flip-flop. Counters: Synchronous and Asynchronous.	**9hrs**
MODULE 4	**Basic computer organization and design** Introduction,Instruction codes, Computer registers, Computer instructions, timing and control, hard wired control,micro programmed control, execution and instruction, input output interrupt. Design of computer	**9hrs**
MODULE 5	**Central Processor Organization** Processor bus organization, arithmetic logic unit (ALU),Instruction formats, Addressing modes, data transfer and manipulation, program control, microprocessor organization.	**9hrs**
MODULE 6	**Input-output organization and memory organization** Peripheral devices, asynchronous data transfer, direct memory access,(DMA),priority Interrupt, input output processor,Introduction, memory hierarchy, main memory, auxiliary memory, cache memory .	**9hrs**

TITLE: Programming In C		
PAPER CODE:	**CREDITS :**	**TOTAL NO OF HRS: 52**

Objectives:

- ✓ To study about algorithms, flowcharts and programs. To solve problems through logical thinking.
- ✓ To clearly understand the logic of the problem. To analyze the given problem and write the algorithm, flowchart.
- ✓ To write structured C programs, this is the foundation of any programming language.

MODULE 1	**Introduction to Programming Concepts** Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts with examples. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.	**8hrs**
MODULE 2	**Managing Input and Output Operation**: Formatted and Unformatted I/O Functions, Decision making, branching and looping: Decision Making Statements - if Statement, if–else statement, nesting of if-else statements, else–if ladder, switch statement, ?: operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements.	**8hrs**
MODULE 3	**Functions**: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.	**9hrs**
MODULE 4	**Arrays:** Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.	**9hrs**
MODULE 5	**Structures** Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions.	**9hrs**

TITLE: C Programming Lab

PAPER CODE: L1.1	CREDITS : 1	NO OF HRS: 3hrs/week

Section : A

1. Printing the reverse of an integer
2. Generate first N prime numbers
3. Get a string and convert the lowercase to uppercase and vice-versa without using library functions.
4. Find the occurrence of a particular character in a string
5. Input a string and find the number of each of the vowels which appear in the string.
6. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
7. Print the reverse of a string.
8. Find the first N terms of Fibonacci series using arrays
9. Declare 3 pointers variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of variables.
10. Program to demonstrate structure and union.
11. Recursive program to find the factorial of an integer.
12. Find the maximum of 4 numbers by defining a macro for the maximum of two numbers.

Section : B

1. ArrangingNnumbersinascendingandindescendingorderusingbubblesort.
2. Checking whether the given matrix is an identity matrix or not.
3. Addition and subtraction of two matrices.
4. Multiplication of two matrices.
5. Convert a hexadecimal number into its binary equivalent.
6. Check whether the given string is a palindrome or not.
7. Demonstration of bitwise operations.
8. Applying linear search to a set of N numbers by using a function.
9. Createasequentialfilewiththreefields:empno,empname,empbasic.Printall the details in a neat format by adding 500 to their basic salary.
10. Arrange N names in alphabetical order

Text Books:

1. A.P. Verma, Business Mathematics and Statistics, Asian Books Private Limited, New Delhi.
2. Stephen Ross, Randolph W Westerfield & Bradford Jordan, Fundamentals of Corporate Finance, Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. P.L. Mehta, Managerial Economics, Sultan Chand & Sons, New Delhi.
4. B.G. Umarani, Dr. P.G. Umarani, Mathematics for II year pre-University Course, Quality Publishers.
5. G.B. Gururajachar, Text Book of Mathematics (BSc – I, II, III, IV Semester), Academic Excellent Series Publication.

SEMESTER II

II SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	B(DS)2.1	Mathematics-II	4	30	70	100	4
	B(DS)2.2	Statistics-II	4	30	70	100	4
	B(DS)2.3	Data Structures	4	30	70	100	4
	B(DS)2.4	RDBMS- MySQL	4	30	70	100	5
	L2.1	Data Structures Lab	3	15	35	50	1
	L2.2	Mathematics – II and Statistics - II Lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	50	1
Total Marks and credits			**31**	**225**	**525**	**750**	**24**

Text Books:

1. Hogg & Tanis, Probability & Statistical Inference – Sixth Edition, Pearson Education.
2. S.M. Ross, Introduction to Probability and Statistics, John Wiley and Sons.
3. K.C. Bhuyan, Probability, Distribution theory and statistical inference – NCBA.
4. V.K. Rohatgi, A.K.MD. Ehsanes Saleh (2002), An Introdution to Probability Theory and Mathematical Statistics, John Wiley (WSE).
5. Probability and Statistics, Schaum Series.
6. Walpolw, Myers, Probability and Statistics for Engineers and Scientists, Eighth Edition, Pearson Education .
7. S. Sundararajan, Monograph on Statistics and Probability. (No Publication).
8. Dr. B.S. Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
9. Dr. Alka Chaudhary, Dr. Arun Kumar, Probability Theory, Krishna Prakashan Media (P) Ltd.
10. Vijay K. Rohatgi, A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, Second Edition, Wiley Series in Probability and Statistics.
11. S. Sundararajan, Monograph on Statistics and Probability. (No Publication).
12. Harry Frank, Steven C. Althoen, Statistics Concepts and Applications, Cambridge University Press.
13. Murray R. Spiegel, Larry J. Stephens, Statistics, Third Edition, Schaum's Outlines.
14. C.M. Chikkodi, B.G. Satyaprasad, B.Com Business Statistics, Himalaya Publishing House.
15. Dr. B.N. Gupta, Statistics, (No Publication)
16. V. Sundarapandian, Probability, Statistics and Queueing Theory, PHI Learning Private Limited.
17. Vijay K. Rohatgi, A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, Second Edition, Wiley Series in Probability and Statistics.

Reference Books:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2013.
2. Robert Kruse, C.L.Tondo, Bruce Leung, ShashiMogalla, "Data Structures and Program Design using C", Pearson Education, 2009.
3. Forouzan, "A Structured Programming Approach using C", 2nd Edition, Cengage Learning India, 2008.

MODULE 5	Secondary Storage device: Secondary Storage devices, Buffering of Blocks, Files on disk, Operations on files, File organization: Ordered files, Hashed files, Indexed files, Heap files, RAID organization.	**09hrs**
MODULE 6	Concurrency Control Techniques Concurrency Control Techniques, Recovery Techniques on databases, Transaction processing concepts, Database security and authorization. Introduction to Distributed databases, Data fragmentation, Replication and Allocation in distributed database, Query Processing in Databases.	**09hrs**

Text Books:

1. RemezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5 th Edition, Pearson Education, 2007.

Reference Books:

1. Abrahamsi.Silberschatz,Henry.F.Korth,S.Sudarshan,"DatabaseSystemConcepts" 6th Edition, McGraw Hill, 2012.
2. C.J.Date, "Introduction to database systems", Eight Edition, Addison Wesley

TITLE: Mathematics–II & Statistics-II LAB

PAPER CODE:L2.2	CREDITS : 1	NO OF HRS: 3hrs/week

SECTION: A

1. Basic commands (Introduction).
2. Solve definite and indefinite integrals.
3. Obtain partial derivative for some standard functions.
4. Verify Euler's theorem.
5. Find extreme value of the function.
6. Find feasible region to linear programming problems.

SECTION: B

1. Probability distributions (Univariate and Bivariate probability distributions, Generation of observations from different distributions, evaluation of probabilities, etc..)
2. Construction of sampling distribution of sample mean and sample variance, Applications of Central Limit Theorem.
3. Identification of different hypotheses types and evaluation of probability of type I and type II errors and powers of tests (Discrete and Continuous distributions)
4. Tests concerning population mean and equality of two population means.
5. Tests concerning population proportion and equality of two population proportions.
6. Tests concerning population variance and equality of two population variances.
7. Chi-Square test for goodness of fit and independence of attributes.
8. Analysis of variance for a one way classified data.
9. Estimation of parameters by the methods of maximum likelihood and method of moments. Interval estimation.

TITLE: Statistics Inference

PAPER CODE: B(DS)3.1	CREDITS : 4	TOTAL NO OF HRS: 52

Objectives:

- ✓ This paper will help students to have a thorough knowledge of descriptive basic statistics.
- ✓ This course will help students to develop a deeper understanding of the basis underlying probability distributions and modern statistical inference and equip them with a statistical tool kit which will enable them to apply the knowledge and skills to real world tasks.
- ✓ Students will be able to analyze the difference among group means in a sample.

MODULE 1	**Estimation** Point estimation: Estimator, Estimate, Unbiasedness, Consistency, Sufficiency, Methods of estimation (MLE and MME). Interval estimation: Confidence interval, Confidence coefficient, Confidence limits, One-sided and two-sided confidence internals, Confidence intervals for the mean, Difference between means, Variance, Ratio of variances, Proportions and difference between proportions for normal population(s).	**15hrs**
MODULE 2	**Statistical Hypothesis** Statistical hypotheses – Null and alternative, Simple and composite hypotheses, One-sided and two-sided, Critical and acceptance regions, Type – I and Type – II errors, Level of significance, p-value.	**10hrs**
MODULE 3	**Tests of significance** Tests of significance of a population mean, Difference between means, Variance and difference between variances, Proportion and difference between proportions, Test for goodness of fit and independence of attributes, Relations between test of hypothesis and confidence interval.	**12 hrs**
MODULE 4	**ANOVA** Analysis of variance (ANOVA) – Introduction, Logic and overview, Formulation, Decisions. Foundation of ANOVA, Linear model for ANOVA, Test statistic (Mean squares) and rejection rule for ANOVA, Two-way ANOVA, Linear model for two-way ANOVA, Hypothesis and test statistics for two-way ANOVA.	**15 hrs**

TITLE: Python Programming

PAPER CODE: B(DS)3.3	CREDITS : 4	TOTAL NO OF HRS: 52

Objectives:

- ✓The course is designed to provide Basic knowledge of Python.
- ✓Python programming is intended for Software development and coding in software Industry.
- ✓Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration.
- ✓This course is an introduction to the Python programming language for students without prior programming experience.

MODULE 1	Teaching Hours RBT Levels Introduction to Computers, Programs, and Python Elementary Programming, History of Python, Basic Features of Python ,Mathematical Functions, Strings, and Objects	**09hrs**
MODULE 2	CreatingPythonPrograms,Selections,Loops,Functions.Programmingexamples	**09hrs**
MODULE 3	Functional programming, Objects and Classes, More on Strings and Special Methods, GUI Programming Using Tkinter, Programming examples	**12 hrs**
MODULE 4	Lists, Multidimensional Lists, Object Oriented Programming, Inheritance and Polymorphism, Programmingexamples	**08 hrs**
MODULE 5	Files: Files and Exception handling, tuples, sets and dictionaries, recursion, programming examples.	**14 hrs**

Text Books:

1. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, ISBN:978-0- 13-274718-9, 2013

2. Exploring Python, Timothy A. Budd, Indian edition, McGraw Hill education, ISBN-13: 978-0-07-132122-8

Reference Books:

1. Kenneth A. Lambert , B.L Juneja , "Fundamentals of Python Programming", Cengage Learning,ISBN:978- 81-315-2903-4,2015

2. Charles Dierbach. "Introduction to Computer Science Using Python: Computational Problem-Solving Focus", Wiley,ISBN:978-81-265-5601-4,2015

3. Allen B.Downey,"Think Python",O'Reilly,First Edition,2012,ISBN:978-93-5023- 863-9

TITLE: Python Programming Lab

PAPER CODE: L3.2	CREDITS : 1	NO OF HRS: 3hrs/week

1. Program to demonstrate mathematical functions.
2. Program to calculate Body mass Index by accepting height and weight.
3. Program to demonstrate Bank transactions using class and objects.
4. Program to generate prime numbers and calculate CPU time using time module.
5. Program to generate different permutations of a given String using functions.
6. Program to demonstrate format specifiers of python by calculating interest and Principle amount for 'n' number of years.
7. Program to sort given numbers using selection Sort.
8. Program to convert temperature to Fahrenheit and vice versa using functions.
9. Program to find different areas of shapes using functions.
10. Program to find the occurrence of Character in a given file.
11. Program to generate Login Page UI using Tkinter.
12. Program to accept data from a Excel Sheet of temperature database and calculate the maximum and minimum temperature recorded using pandas.
13. Program to demonstrate list methods.
14. Program to demonstrate String methods in python.

TITLE: MACHINE LEARNING I

PAPER CODE: B(DS)4.1	CREDITS : 4	TOTAL NO OF HRS: 52

Objectives:

- ✓ This course will serve as a comprehensive introduction to various topics in machine learning.
- ✓ At the end of course student be able to design and implement machine learning solutions to classification, regression and clustering problems.
- ✓ It evaluates and interpret the results of algorithms.

MODULE 1	Introduction ,What is Machine Learning?,Supervised Learning,Unsupervised Learning,Linear Regression with One Variable Model Representation,Cost Function,Gradient Descent method for linear egression. A review of Linear Algebra.	**09hrs**
MODULE 2	Linear Regression with Multiple Variables, Gradient Descent for Multiple Variables, Octave tutorial,Features and Polynomial Regression, Normal Equation	**08hrs**
MODULE 3	Logistic Regression,Classification, Hypothesis Representation, Decision Boundary,Cost Function, Simplified Cost Function and Gradient Descent,Advanced Optimization	**08hrs**
MODULE 4	Neural Networks: Representation, Non-linear Hypothesis,Neurons and the Brain,Model Representation, Examples,Multi-class Classification, Multi-class Classification and Neural Networks	**09hrs**
MODULE 5	Neural Networks: Learning, Backpropagation Algorithm, Gradient Checking, Random Initialization, Application case study, Neural Network Learning	**09hrs**
MODULE 6	Applying Machine Learning in Practice, Evaluating a Hypothesis , Model Selection and Train/Validation/Test Sets ,Bias, Variance ,Regularization and Bias/Variance ,Learning Curves	**09hrs**

TITLE: Data Mining

PAPER CODE: B(DS)4.2	CREDITS : 4	TOTAL NO OF HRS: 52

Objectives:

- ✓ Interpret the contribution of data warehousing and data mining to the decision-support level of organizations.
- ✓ Evaluate different models used for OLAP and data preprocessing.
- ✓ Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis.
- ✓ Design and implement systems for data mining.
- ✓ Evaluate the performance of different data-mining algorithms.
- ✓ Propose data-mining solutions for different applications.

MODULE 1	Introduction to Data Warehousing and Data Mining: Component and Processes, ETL, Data Mart, Decision Support system, Executive Information system. What is Data Mining? Motivating Challenges; The origins of data mining, Data Mining Tasks.	**08hrs**
MODULE 2	Data: Types of Data; Data Quality; Data Preprocessing; Measures of Similarity and Dissimilarity. Exploring Data: OLAP, Multidimensional Data Analysis, Data cube model, Visualization.	**08hrs**
MODULE 3	Classification: Preliminaries; General approach to solving a classification problem, Decision tree induction, ID3, CD4, CART Algorithms, Rule-based classifier; Nearest- neighbor classifier.	**09hrs**
MODULE 4	Association Analysis: Problem Definition, Frequent Item set generation; Rule Generation , Compact representation of frequent item sets, Alternative methods for generating frequent item sets. FP-Growth algorithm, Evaluation of association patterns, Effect of skewed support distribution, Sequential patterns.	**09hrs**
MODULE 5	Cluster Analysis: Overview, K-means, Agglomerative hierarchical DBSCAN, Overview of Cluster Evaluation.	**09hrs**
MODULE 6	Multidimensional analysis and descriptive mining of complex data objects; Spatial data mining, Multimedia data mining; Text mining. Applications: Data mining applications, Additional themes on Data mining; Social impact of Data mining; Trends in Data mining.	**09hrs**

TITLE: Web Technology		
PAPER CODE:B(DS)4.3	**CREDITS : 4**	**TOTAL NO OF HRS: 52**

Objectives:

- ✓ Students should learn to develop object-oriented programs using C#.
- ✓ Be able to develop window forms, web forms and GUI based programs.
- ✓ Students will gain the skills and project based experience needed for entry into web application and windows applications.

MODULE 1	**Introduction to .Net Framework and C#:** The .Net Programming Frame work, .Net Languages, Common Language Run Time, The .Net Class Library Necessity of C#, Evolution of C#, Characteristics of C#, Applications, Structure of C# program, Name spaces, providing interactive inputs, multiple main methods, C# tokens, literals, variables, data types, value types, reference types, Boxing and Unboxing, for-each statement, Methods in C#, Handling Arrays.	**08hrs**
MODULE 2	**Classes and Objects:** Defining a class, Adding Variables, Adding Methods, member access modifiers, creating objects, accessing class members, static members and static constructors, constant members and read-only members, properties, indexers, Delegates andEvents.	**08hrs**
MODULE 3	**Data Access with .NET.** ADO.NET overview, Using database connections, commands, The data reader, the dataset class, populating dataset class with a data adapter. The DataGridView Control, DataGridView Class Hierarchy, Data binding.	**09hrs**
MODULE 4	**Developing ASP.NET Application and Web Controls** ASP.NET Application, Code behind model, The Global. Asax application File, Understanding ASP.NET Classes, Web form Fundamentals. Basic Web control classes, Auto Post back and Web control Events, Assessing Web controls Using Visual Studio .NET.	**09hrs**
MODULE 5	**Validation and Rich Controls and State management.** Validation Controls, Validation Process, Validation Classes, Server side Validation Classes, Manual Validation, Understanding Regular Expression, Custom Validation, View State, TransferringInformation,CustomCookies,SessionState,ApplicationState.	**09hrs**

TITLE: Web Technology Lab

PAPER CODE: L4.3	CREDITS : 1	NO OF HRS: 3hrs/week

PART A: C#

1. Write a C# program toaccept students register number,nameand 3 subjects marks and perform the following.
   a) Displayallstudentdetailswithtotalmarks. b)Display student details whoscored highest marks c)Displayall student namesinascendingorder.
   Design a system using class called book with a suitable members.

2. A bookshop maintains the inventory of books that is being sold. The List includes book title, author name,price and stack position. The shop keeper Performs following activities
   a) Add new books to inventory
   b) Add stock to existing stock
   c) Search a particular book
   d)Displaystockdetails.
   Design a system using class called inventory with a suitable members.

3. Write a program to create a class studentwith datamembers registernumber,name and three subject's marks.Set the values of the datamembers by using **indexers**.Calculate total marks ,averge and declare the class.Display all the information of the student with classs.

4. Write a Program to find sum and difference of two matrices using multicast delegates.

5. Write a Program to generate the first N even numbers and fobonacci numbers using events.

6. Create a database *Bank* in which create a table customer with fields *Account Number*, *Name*,*Accounttype* and*Total Balance*.Writeaprogramtoperformthefollowing.
   a) Display all the records of the customer table.
   b) Display Account number and name of the customers whose account type is "SB"
   c) Update the total balance by adding bonus amount Rs 500whose balance is greater than or equal to 10,000.

7. Createadatabase*Emp*inwhichcreateatablecustomerwithfields*Employee Id*, *Name*, Designation and*Basic Salary*.Writeaprogramtoperformthefollowing.
   a) Display all the records of the Emp table.
   b) Display number of records present in the table
      Display the details of the employee who has highest basic salary.

SEMESTER V

V SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 2	B(DS)5.1	Machine Learning - II	4	30	70	100	4
	B(DS)5.2	Natural Language Processing	4	30	70	100	5
	B(DS)5.3	Cloud Computing	4	30	70	100	5
	B(DS)5.4	Big Data Analytics	4	30	70	100	4
	B(DS)5.5	Applications of Data Science	4	30	70	100	5
	L5.1	Machine LearningLab	3	15	35	50	1
	L5.2	Big Data Analytics Lab	3	15	35	50	1
	L5.3	Mini Project	6	30	70	100	2
Total Marks and credits			**32**	**210**	**490**	**700**	**27**

TITLE: Natural LanguageProcessing

PAPER CODE: B(DS)5.2	CREDITS : 5	TOTAL NO OF HRS: 52

Objectives:

- ✓ To understand how key concepts from NLP are used to describe and analyze the language.
- ✓ Understanding semantics and pragmatics of English language processing.
- ✓ It will focus on the computational properties of Natural languages and algorithm use to process them, as well as the match between grammar formalisms and the linguistic data that needs to be covered.

MODULE 1	Mathematics for ML and NLP:Probability review - random variables, axioms of probability, joint distribution, conditional probability, review of normal (and other) distributions, sum and product rules of probability, independent variables, **expectation maximization** (the most important concept in ML), bias variance,Linear algebra review - matrix operations, representing things as vectors, rank of a matrix	**9hrs**
MODULE 2	Naive Bayes theorem, SVMs, linear and logistic regression,Assignments in math and somethingsimplelikeaspam/notspamclassifier.Extrawork:IntrotoNLTK, scikit- learn, numpy, scipy and how to use these tools Most basic form of NLP - regular expressions and how to write them Language modeling - given a sequence of words, what is the probability of this sequence occurring in a document, n-grams, smoothing and data sparsity, Linguistics - parts of speech, lemmatization, stemming, stripping punctuation and other forms of data cleaning, tokenization (problems of how to tokenize e.g. tokenization in Chinese is different from English) State machines and sequence modeling Tf-idf, word-document frequencies.	**9hrs**
MODULE 3	Intro to perceptrons and feedforward networks. Generative and discriminative models Backpropagation algorithms Hidden Markov Models (HMM) Forward algorithm, backward algorithm, forward-backward, Viterbi algorithm.	**8hrs**
MODULE 4	Basics of ML predictions - training, testing and validation - a model can only recognize labels it's seen before, difficulties of collecting and cleaning data. Named entity recognition (NER) (also cover pitfalls and problems), examples of how understanding language is hard, even for humans Dependency parsing and understanding relationships between words ("I saw a boy with a bicycle" - did you see a boy who had a bicycle or did you see a boy and an unrelated bicycle?) Context free grammars and syntax in language (Chomsky hierarchy, CKY algorithms)	**9hrs**

TITLE: Cloud Computing

PAPER CODE: B(DS)5.3	CREDITS : 5	TOTAL NO OF HRS: 52

Objectives:

- ✓ Understand various basic concepts related to cloud computing. Technologies.
- ✓ Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS.
- ✓ Understand big data analysis tools and techniques.
- ✓ Understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- ✓ Understand different cloud programming platforms and tools.

MODULE 1	**Understanding Cloud** Origin and influences, A brief History, Definitions, Business Drivers, Technology Innovations , Clustering Grid Computing, Virtualization, Technology Innovations vs. Enabling Technologies, Roles and Boundaries , Cloud Consumer, Cloud Service Owner, Cloud Characteristics , On-Demand Usage , Ubiquitous Access Multitenancy (and Resource Pooling) , Elasticity , Measured Usage , Resiliency	**8hrs**
MODULE 2	**Cloud Delivery and cloud deployment models** Cloud Delivery Models, Infrastructure-as-a-Service (IaaS) , Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Comparing Cloud Delivery Models , Combining Cloud Delivery Models , *IaaS + PaaS , IaaS + PaaS + SaaS* , Cloud Deployment Models . Public Clouds , Community Clouds, Private Clouds , Hybrid Clouds , Other Cloud Deployment Models	**8hrs**
MODULE 3	**Cloud Models** Introduction, Storage as a service, Amazon storage services, Compute as a service Amazon elastic compute cloud(EC2) , Cloud System matrix, Platform as Service, Windoes Azure, Google Apps Engine, Amazon Web services, Software as a Service CRM as a service, sales force.com	**9hrs**
MODULE 4	**Data Center** Introduction to Data center, Virtualization, Standardization and modularity, Automation, Remote operation and management, Data center Security and facilities, Computing hardware, storage hardware, Network hardware, LAN fabric , SAN fabric, NAS gateways.	**9hrs**
MODULE 5	**Cloud Virtualization Technologies** Server Virtualization, Hypervisor based Virtualization, Hardware support Virtualization, VMware Virtualization software, Storage Virtualization, Hardware independence, Server Consolidation, Resource replication, Virtualization Management, Hypervisor clustering architecture.	**9hrs**

TITLE: BIG DATA ANALYTICS

PAPER CODE:B(DS)	CREDITS :4	TOTAL NO OF HRS: 52

Objectives:

- ✓ Introduce students the concept and challenge of big data (3 V's: volume, velocity, and variety).
  Teach students in applying skills and tools to manage and analyze the big data.

MODULE 1	**Preparatory:** Data Science landscape, relevance and importance of data analytics, Data sources: Social data - from organizations like WHO and social sites like face book. Government data - like data.gov.in, Data from own organization, Data formats: Structured, Semi-structured, Unstructured , Excel for presentation and simple visualization of structured data. Raw and Processed Data, Components of Tidy Data, Downloading Files, Reading Local Files, Reading Excel Files, Reading XML, Reading JSON, Reading from MySQL, Reading from HDF5, Reading from The Web, Reading From APIs.	**08hrs**
MODULE 2	**Data preparation / Mugging:** Subsetting and Sorting, Summarizing Data, Handling missingvalues,CreatingNewVariables,ReshapingData,Merging Data.	**08hrs**
MODULE 3	**Data Exploration:** Exploratory Graphs	**09hrs**
MODULE 4	**Data Modelling:** Data grouping, frequency, and aggregation, Handling missing data, Textmanipulationandformatconversion,Assertionsandlogical operations	**09hrs**
MODULE 5	**Analysis**: Mathematical functions, Sampling , Relationship between variables, Rank and percentile Time series analysis, Descriptive statistical measures, Confidence level, Analysis of variance, Correlation Covariance, Regression, Movingaverage	**09hrs**
MODULE 6	**Visualisation** Comparison among items, Comparison over time, Relationship - two variables and three variables, Distribution - histogram, line chart, scatter chart, 3D area chart, Composition - static and changing over time	**09hrs**

Text Books:

1. JakeVanderPlas, PythonDataScienceHandbook:EssentialToolsfor working with Data , O'Reilly, 2017
2. W Mckinney, Python for Data Analysis, O'Reilly, 2013

Reference Books:

1. MurtazaHaider,GettingStartedwithDataScience,IBMPress,2015
2. DavyCielen,IntroducingDataScience:BigData,MachineLearning,and More, Manning,2016

TITLE: BIG DATA ANALYTICAL LAB

PAPER CODE:L5.1	CREDITS : 1	NO OF HRS: 3hrs/week

In "1.2 Two_Novels.ipynb" discussed in the class, you found that Huck's name is mentioned the least because the story is told in first person. Find counts of Huck as subject ('I') and object ('me') and add the plots to those of Jim, Tom,
and Huck.

In the two novels, count the number of occurrences of other subject and object occurrences: he, his, she, her, they, them, we, us. Plot the cumulative counts.
Look for patterns.

Draw similar plots for occurrences of names in Little Women. What pattern do you find? What do you infer from the plots?

For the two novels,

a) Count the number of sentences by chapter.
b) Lengths of chapters.
c) Average length of sentences by chapter.
d) Average length of words by chapter.

5. The following is the directory structure you now have:

```
/Data Analytics
    /Data
        /Notebooks
```

Add subdirectories to reflect the following:

```
/Data Analytics
    /Data
    /Notebooks
    /Pourakarmikas
        /PDF
        /TXT
        /REC
```

Programmatically download the PDF files in URL-PK.txt and save them at /Data Analytics/Pourakarmikas/PDF

The cost of conducting census 2011 was ₹2,200 crore. How can we benefit from this massive work product?

a) Download census data for the country. Understand the structure and data contents. Classify the data to various groups. What analyses can we do with the data?
b) Create a table with the names of 100 most populous cities of the country, and (their population, and population density) in 2001 and 2011.

each part and assign the values to the appropriate row in the empty dataframe.

- From "../Data/Form_20/AC170_Polled.xlsx" make a dataframe with total votes polled per part.
- Merge the two dataframes.
- Create a new column with turnout%.
- Calculate quantiles for turnout%.

10 02 Nov 2017

a) 1From http://ceokarnataka.kar.nic.in/ClaimsObj.aspx download Form types 6, 7, 8, and 8A in spreadsheet format for Jayanagar constituency.
b) Reading the files, create dataframes with appropriate column names.
c) Remove unwanted rows.
d) Remove unwanted columns.
e) Create new columns where needed.
f) Attempt for the remaining constituencies of Bangalore.

11 Final data in various forms would be as follows: Form 6:

Part	Date	Name	Relative	Reln	Status	Reason
Form 7:						

Part	Serial	Name	Status	Reason
Form 8:				

Part	Serial	Name	Status
Form 8A			

New Part	Name	Old Part	EPIC	Address	Status	Serial	Reason

Use 'apply' feature of dataframe to change contents of columns and also to create new columns

In all cases,

- Give one word status.
- Rreason would be applicable for rejections. For the rest, state 'NA'
- Check contradictions like - approved for inclusion, may be deleted

VI SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Project/Internship			32	210	490	700	24
Total Marks and credits			**32**	**210**	**490**	**700**	**24**

The National Education Society of Karnataka®

THE NATIONAL COLLEGE

36th B cross, 7th block, Jayanagar, Bangalore-70
(Autonomous Institution, Affiliated to Bangalore University)

ಶ್ರದ್ಧಾವಾನ್ ಲಭತೇ ಜ್ಞಾನಂ

DEPARTMENT OF COMPUTER SCIENCE

Bachelor Of Computer Application(IoT)

B.O.S Meeting - 29th March 2019

PROGRAM OUTCOMES (PO):

BCA(Internet of Things) graduate will be able to

PO1 : This Program aims to train students to be equipped with a theoretical foundation systematic professional knowledge and strong practical skills in the field of communication network and IT that provides wide range of applications in IoT.

PO2 : To Teach technical Skills, enhance non technical skills that are tapped-up with orientation by industry expert that significantly improving industry Readiness Quotient.

PO3: To teach Analysis of IoT data ,including statistical inference.

PO4: To Provide Strong fundamentals of embedded electronics, Communication system and protocols for Io T communication.

PROGRAM SPECIFIC OUTCOME (PSO)

PSO1: Students will get hands on experience in handling microcontrollers and acquire programming skills in C and Verilog. They shall also be exposed to managing large data by learning fundamental theory in Mathematics, Statistics and Database management.

PSO2: Students shall use tools like RTOS to understand the theory in the laboratory, build projects with ARM controller to learn how to create products for the Automobile industry using embedded electronics and also learn programming Python

PSO3: Students shall be taught state of the art subjects like Mobile communication systems and Software defined networks for IoT

DEPARTMENT OF COMPUTER SCIENCE

Proceedings of the BoS meeting of B.C.A(Internet of Things) held on 24th March 2019 from 11.00 a.m. at The National College, Jayanagar, Bangalore – 70.

The Board approved the following for the BCA (I.o.T)course.

1. Combining Electronics I and II in I Semester.
2. Introducing the course "Data Structure Using Python or R" and Corresponding lab in II semester.
3. Replacing the course Electronics II" with "Operating System" in II Semester.
4. Combining "Computer Networks" and "Communication System" and introducing Communication lab in III Semester.
5. Introducing DBMS and DBMS lab in III Semester.
6. Combining the courses "Sensing and Actuating Devices" and "I.o.T "in IV semester.
7. Introducing the course " Computer Architecture " in IV semester.
8. Introducing " Cloud computing " Lab in V semester.
9. Replacing the course "Embedded system" with RTOS.

THE NATIONAL COLLEGE

AUTONOMOUS

Jayanagar, Bangalore - 560 070.

Website : www.nationalcollegejayanagar.org E-mail : ncjblore@yahoo.com

NAAC ACCREDITED 'A' GRADE

॥ श्रद्धाहि परमा गतिः ॥

DEPARTMENT OF COMPUTER SCIENCE

Ref. : ..... Date .....

Attendance list of the BOS members present on

29th March 2019 for B.C.A(I.o.T)

Sl.No	Members Name	Address	Signature
1.	**Prof. Shalini.C** Chairperson	Associate Prof.& HOD of Computer Science The National College Jayanagar, Bangalore - 70	
2	**Dr. Muralidhara.B.L** University Nominee	Professor, & Coordinator, MCA Programme Bangalore University	29-03-2019
3	**Dr. Manjesh** Subject Expert	Associate Professor, Dept. of Electronics Science Bangalore University	
4	**Dr. Renuka Prasad**.B Subject Expert	Assistant Professor Dept. of MCA RVCE.	B. Renuka Prasad
5	**Mr. Shivapradsad** Industrial Representative	Senior Product Manager GE	
6	**Mr. Vijay Mysore** Alumni Representative	Entrepreneur	
7.	**Dr. Madura** K.R Member	Coordinator-PG Mathematics The National College ,Jayanagar	
8.	**Prof. Amarprabhu** Member	Asst. Professor, Dept. of Mathematics The National College ,Jayanagar	
09.	**Prof.Cheluppa S** Member	Assoc. Prof.,Dept. of Electronics The National College ,Jayanagar	
10.	**Prof. Mahadeva**.M Member	Assoc. Prof., Dept. of Electronics The National College ,Jayanagar	
11.	**Prof. Varada Raj**.R Member	Assistant Professor The National College ,Jayanagar	
12.	**Prof. Manjula S** Member	Assistant Professor The National College ,Jayanagar	Manjula.S

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5	**Mr. Shivapradsad** Industrial Representative	Senior Product Manager GE	
6	**Mr. Vijay Mysore** Alumni Representative	Entrepreneur	
7.	**Dr. Madura** K.R Member	Coordinator-PG Mathematics The National College ,Jayanagar	
8.	**Prof. Amarprabhu** Member	Asst. Professor, Dept. of Mathematics The National College ,Jayanagar	
09.	**Prof.Cheluppa S** Member	Assoc. Prof.,Dept. of Electronics The National College ,Jayanagar	
10.	**Prof. Mahadeva** M Member	Assoc. Prof., Dept. of Electronics The National College ,Jayanagar	
11.	**Prof. Varada Raj** R Member	Assistant Professor The National College ,Jayanagar	
12.	**Prof. Manjula S** Member	Assistant Professor The National College ,Jayanagar	Manjula.S

THE NATIONAL COLLEGE JAYANAGAR, BANGALORE-70

PROPOSED BACHELOR OF COMPUTER APPLICATION (Internet of Things)

COURSE MATRIX

I SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	Title		IA	Exam	Total	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT1.1	Basic Electronics-1	4	30	70	100	5
	BIoT1.2	Mathematics-I	4	30	70	100	5
	BIoT1.3	Programming in C	4	30	70	100	4
	BIoT1.4	Digital Electronics & Verilog	4	30	70	100	4
	L1.1	Digital Electronics & Verilog lab	3	15	35	50	1
	L1.2	C programming	3	15	35	50	1
Part 3		Mandatory Paper	1	30	70	100	1
		Total Marks and credits	**34**	**240**	**560**	**800**	**25**

II SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT2.1	Basic Electronics-II	4	30	70	100	4
	BIoT2.2	Mathematics-II	4	30	70	100	5
	BIoT2.3	Data structure	4	30	70	100	5
	BIoT2.4	8051 Microcontroller	4	30	70	100	4
	L2.1	Analog Electronics Lab	3	15	35	50	1
	L2.2	8051 Microcontroller lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	50	1
		Total Marks and credits	**34**	**225**	**525**	**750**	**25**

III SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT3.1	ARM Microcontroller	4	30	70	100	4
	BIoT3.2	Network Protocols.	4	30	70	100	5
	BIoT3.3	Communication System	4	30	70	100	4
	L3.1	ARM microcontroller lab	3	15	35	50	1
	L3.2	Communication lab	3	15	35	50	1
	Project	Python Programming	4	30	70	100	4
Part 3		Mandatory Paper	1	15	35	50	1
		Total Marks and credits	**34**	**225**	**525**	**750**	**24**

IV SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT4.1	Sensing and Actuating Devices	4	30	70	100	4
	BIoT4.2	Statistics	4	30	70	100	5
	BIoT4.3	Internet of Things	4	30	70	100	4
	L4.1	IoT lab	3	15	35	50	1
	L4.2	Sensing and actuating lab	3	15	35	50	1
	Project	Arduino & Raspberry pi Projects	4	30	70	100	4
Part 3		Mandatory Paper	1	15	35	50	1
		Total Marks and credits	**34**	**225**	**525**	**750**	**24**

V SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 2	BIoT5.1	Cloud architecture and computing	4	30	70	100	5
	BIoT5.2	Embedded system design &RTOS	4	30	70	100	4
	BIoT5.3	Advanced sensor networks	4	30	70	100	5
	BIoT5.4	Data analytics	4	15	35	50	5
	L5.1	Embedded systems Lab	3	15	35	50	2
	Project	**(IoT/Embedded)**	4	30	70	100	4
Total Marks and credits			**23**	**150**	**350**	**500**	**25**

VI SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Project/Internship			23	150	350	500	22
Total Marks and credits			**23**	**150**	**350**	**500**	**22**

All Six Semester Matrix

Semester	Hours/week	Marks			Credit
		IA	Exam	Total	
First	34	240	560	800	25
Second	34	225	525	750	25
Third	34	225	525	750	24
Fourth	34	225	525	750	24
Fifth	23	150	350	500	25
Sixth	23	150	350	500	22
Total Marks and Credits				4050	145

SEMESTER I

I SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT1.1	Basic Electronics-I	4	30	70	100	5
	BIoT 1.2	Mathematics I	4	30	70	100	5
	BIoT 1.3	Programming in C	4	30	70	100	4
	BIoT 1.4	Digital Electronics & Verilog	4	30	70	100	4
	L1.1	Digital Electronics & Verilog	3	15	35	50	1
	L1.2	C programming	3	15	35	50	1
Part 3		Mandatory Paper	1	30	70	100	1
Total Marks and credits			**34**	**240**	**560**	**800**	**25**

TITLE: BASIC ELECTRONICS-I		
PAPER CODE: BIoT1.1	**CREDITS : 5**	**TOTAL NO OF HRS: 54**

Objectives:

After studying this paper the students will be able to

- ✓ Analyze the circuits using Kirchhoff's laws and Network theorems.
- ✓ Analyze the Series and parallel resonant circuits.
- ✓ Analyze the basic working of pn junction diode and its applications
- ✓ Analyze the BJT and FET circuits.

MODULE 1	**Passive Components & AC Circuits:** **Resistors:** Specification, tolerance, rating, colour code, power dissipation, types of resistors- Fixed and variable. **Capacitors:** Specifications, colour code, energy stored in a capacitor, types of capacitors-fixed and variable, electrolytic. **Inductors:** Specifications, energy stored in an inductor, types-air core and iron core, chokes. **Transformer:** Working, classification, power losses in transformers. Fuses, switches and relays. **AC Circuits :** Representation of a.c, sine wave- cycle, time period, frequency, average value, peak value (amplitude), peak to peak, r.m.s value, phase and phase difference, power factor, form factor, phasor diagram, complex number, j operator, reactance and impedance. RL series and RC series circuits, RLC circuits: series and parallel- impedance curve, selectivity, band width Q factor- comparison between series RLC and parallel RLC circuits. Series and parallel Resonance circuits- condition for resonance, resonant frequency, half power frequencies, BW, quality factor (loaded and unloaded Q), comparison and applications.	**12 hrs**
MODULE 2	**Transient analysis and Network Theorem:** Transient analysis of RC and RL circuits, time constant- representation, energy stored in inductors and capacitors. **Network theorems (DC analysis):** Current and Voltage sources: Ideal and real voltage and current sources D.C resistive circuits: Voltage divider and Current divider theorems open and short circuits. Kirchhoff's laws- mesh analysis and node voltage method. Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem	**10 hrs**

TITLE: MATHEMATICS-I		
PAPER CODE: **BIoT1.2**	**CREDITS : 5**	**TOTAL NO OF HRS: 54**

Objectives:

On completion of the course, the student will be able to

- ✓ Analyze and understand big and small numbers and their different forms of representation.
- ✓ Comprehend algebraic solutions to simple mathematical and business problems.
- ✓ Solve linear and quadratic equations using multiple methods.
- ✓ Understand information organized in row and column format (matrix), and use algebraic methods to interpret them.
- ✓ Elementary processed in differentiation and integration and appreciate the need for continuous and discrete functions.

MODULE 1	**Linear algebra** Matrices – Nomenclature, Matrix operations – Addition, Subtraction, Multiplication, Inversion. Types of matrices, Characteristics equation of a square matrix, Cayley – Hamilton theorem. Determinants – Evaluation of a determinant, Identical rows and columns, Properties of determinants.	**15hrs**
MODULE 2	**Solution to Systems of Linear Equations** System of linear equations and criteria for unique solutions, Solution of linear equations using Cramer's rule, Elementary row operations, Gauss elimination method, Row echelon form, Iteration solutions to linear equations, Matrix method of solutions.	**15 hrs**
MODULE 3	**Differential and Integral Calculus** Limits, Continuity, Derivative, Derivatives of standard functions (results only), Derivatives of a constant, Derivative of exponential and logarithmic functions, Derivatives of sum, product and quotient of two functions, Differentiation of composite functions – Chain rule, Differentiation of parametric functions. **Integration:** Standard formulae for integration, Methods of integration – Integration by parts, Integration of substitution. **Partial differentiation:** Representation in suffix and differential form, Mixed derivatives, Partial derivatives of higher order. Homogeneous functions, Euler's theorem. Functions of two variables, Parametric representation, Chain rule for partial differentiation.	**16 hrs**
MODULE 4	**Functions, Variables, Equations, and Graphs:** Logarithm, exponential, polynomial functions, rational numbers Basic geometry and theorems, trigonometric identities, Series, sums, inequalities Graphing and plotting, Cartesian and polar coordinates, conic sections	08 hrs

TITLE: PROGRAMMING IN C

PAPER CODE: BIoT1.3	CREDITS : 4	TOTAL NO OF HRS: 54

Objectives:

On completion of the course, the student will be able to

- ✓ To study about algorithms, flowcharts and programs.
- ✓ To solve problems through logical thinking.
- ✓ To clearly understand the logic of the problem.
- ✓ To analyze the given problem and write the algorithm, flowchart.
- ✓ To write structured C programs, this is the foundation of any programming language.

MODULE 1	**Introduction to Programming Concepts:** Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts with examples. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.	**9hrs**
MODULE 2	**Managing Input and Output Operation:** Formatted and Unformatted I/O Functions, Decision making, branching and looping: Decision Making Statements - if Statement, if–else statement, nesting of if-else statements, else–if ladder, switch statement,?: operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements.	**9hrs**
MODULE 3	**Functions:** Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.	**9hrs**
MODULE 4	**Arrays:** Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.	**9hrs**
MODULE 5	**Structures**-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions.	**9hrs**
MODULE 6	**Files** - File modes, File functions, and File operations, Text and Binary files, Command Line arguments. C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.	**9hrs**

TITLE: DIGITAL ELECTRONICS & VERILOG

PAPER CODE: BIoT1.4	CREDITS : 4	TOTAL NO OF HRS: 54

Objectives:

After studying this paper the students will be able to

- ✓ Simplify the Boolean functions using Boolean algebra and K-map technique.
- ✓ Learn about basics of Verilog
- ✓ Realize the combinational circuits.
- ✓ Design the Combinational and Sequential logic circuits using Verilog.

MODULE 1	**Number System** Decimal, Binary, Octal and Hexadecimal – their inter conversion.BCD numbers (8421), Gray, Excess 3, ASCII and EBCDIC codes Arithmetic operations in Binary, Hexadecimal. BCD addition and Excess 3 addition. Sign magnitude convention, 1's and 2's Complements-2's Complement Subtraction, signed number arithmetic-addition. Positive and Negative Logic, Basic Logic gates-AND, OR and NOT gates (Logic symbols and Truth tables), Boolean algebra- Laws and Theorems, NAND and NOR gates (Logic symbols and Truth tables), De Morgan's theorems, NAND and NOR as Universal gates. Simplification of Logic Expressions using Boolean algebra, SOP and POS expressions. Karnaugh maps- K-Map techniques to solve 3 variable and 4 variable expressions.	**14hrs**
MODULE 2	**Basics of Verilog** Introduction to HDL, Structure of Verilog module, Operators, data types, simulation and synthesis Types of descriptions: Data flow descriptions, Behavioral Descriptions, Structural Descriptions, Switch – level descriptions, mixed type descriptions	**12hrs**
MODULE 3	**Modularity in Verilog** Procedure, tasks and functions, advanced HDL descriptions. Synthesis Basics: Highlights of synthesis, Synthesis information from module, mapping process and always in hardware domain.	**08 hrs**
MODULE 4	**Combinational Logic Circuits** Arithmetic Operations: Adders and subtractors, cascading full adders, Look ahead carry, Binary Comparators – 2bit and 4 bit, two bit Multiplier, Multiplexers Realization of 2:1, 4:1 and 8:1 using gates & Applications. Demultiplexer: – Realization of 1:2 1:4 and 1:8 using basic gates & Applications. Encoders: Binary coded decimal codes, Binary – Gray vice versa, BCD – Excess 3 Encoders: Realization and Priority Encoders,	**10 hrs**

TITLE: DIGITAL ELECTRONICS & VERILOG LAB

PAPER CODE: L1.1	CREDITS : 1	NO OF HRS: 3hrs/week

Part-A(Digital Trainer Kits)

1. IC 7400-Realization of AND, OR, NOT, NOR AND X-OR gates and IC 7402-Realization of AND, OR, NOT, NAND and X-NOR gates.
2. Construction of Half Adder and Half subtractor and Construction of Full Adder using IC 7486, 7402 and IC 7432.
3. Binary to Gray code and vice versa using IC 7486.
4. Decimal to BCD Priority encoder and BCD to Decimal Decoder.
5. BCD to seven segment conversion using IC 7447.
6. Study of Multiplexer using IC 74150 and De-Multiplexer using IC 74154.
7. D/A converter using weighted resister method.
8. Unlocked and Clocked SR Flip-Flop.
9. J-K Flip-flop and conversion to D and T flip flop using IC 7476.
10. Four bit binary ripple counter using IC 7476.

Part-B(Verilog Experiments)

1. Introduction to HDL (verilog) and software tool
2. Realization of all the Logic gates
3. Realization of Adder and subtractor (Both Half and Full)
4. Design of Decoders, encoders and comparators
5. Design of Multiplexer, demultiplexer.
6. Implementation of full adder using three modeling styles
7. Design of 32 bit ALU
8. Realization of Flip flops (SR, D, JK and T)
9. Binary and BCD counters (synchronous and asynchronous)
10. Shift register counters – ring counter and Johnson counter

SEMESTER II

II SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT2.1	Basic Electronics-II	4	30	70	100	4
	BIoT2.2	Mathematics-II	4	30	70	100	5
	BIoT2.3	Data structure	4	30	70	100	5
	BIoT2.4	8051 Microcontroller	4	30	70	100	4
	L2.1	Analog Electronics Lab	3	15	35	50	1
	L2.2	8051 Microcontroller lab	3	15	35	50	1
Part 3		Mandatory Paper	1	15	35	50	1
Total Marks and credits			**34**	**225**	**525**	**750**	**25**

	CMRR, Slew rate, SVRR, thermal drift, frequency compensation. Open loop gain, differential gain, limitations, Problems. Feedback in amplifiers: Feedback principles, types of feedback-positive and negative, types of negative feedback-voltage series, voltage shunt, current series and current shunt (block diagram representation for each). Expression for voltage gain of an amplifier with feedback (derivation). Problems. Advantages of negative feedback: Stability, increase in input impedance, increase in bandwidth, decrease in output impedance (derivation for all), disadvantage of negative feedback. Problems. Non inverting (voltage series feedback) amplifier -gain, input and output impedances, band width, total output offset voltage with feedback, voltage follower. Problems. Inverting (Voltage shunt feedback) amplifier-virtual ground, gain, input and output impedances, bandwidth, total output offset voltage, current to voltage converter. Problems.	
MODULE 3	**Applications of Operational amplifier** Adder, Sign Changer, Scale changer, summing amplifier and Subtractor (difference amplifier, Integrator, Differentiator. Instrumentation amplifier. Comparators: Basic comparator, comparator characteristics, Schmitt trigger. Problems. Active filters: Importance of active filter, first order Butterworth low pass, high pass, band pass and band elimination filters, all pass filter. Oscillators: Basic principle of oscillator, tank circuit, Barkhausen criteria, LC oscillators-Hartley and Colpitt's using op-amp, RC oscillators-phase shift oscillator, Wein bridge oscillator. Multivibrators: Types of multivibrators-Block diagrams of astable, monostable and bistable multivibrators-Monostable and Astable Multivibrators using IC 555, Problems.	**12 hrs**
MODULE 4	**Introduction to Power Electronics** Introduction: Power Semiconductor Devices and types of Power Electronic Converters, applications, advantages and disadvantages of Power Electronics converters. **Power Semiconductor Diodes and Transistors:** Types of Power diodes, Switching Characteristics of Power diodes, Power BJTs, Power MOSFETS and Insulated Gate Bipolar Transistors (IGBT). **Thyristors:** Introduction, Principle of operation, anode-cathode characteristics, gate characteristics, two transistor model, switching characteristics (turn-on and turn-off).	**08 hrs**

TITLE: MATHEMATICS-II

PAPER CODE: BIoT.2.2	CREDITS : 5	TOTAL NO OF HRS: 54

Objectives:

On completion of the course, the student will be able to

- ✓ Analyze and understand Laplace and Fourier transforms.
- ✓ Through understanding in set theory.
- ✓ Brief introduction to complex analysis.

MODULE 1	**Laplace transforms:** Definition and basic properties Laplace transform of some common functions and Standard results –Laplace transform of periodic functions-Laplace transforms of derivatives and the integral of function- Laplace transforms, Heaviside function and Dirac-delta function-convolution theorem(no proof)-Inverse Laplace transforms-Laplace transform method of solving ordinary linear differential equations of first and second order with constant coefficients.	**14hrs**
MODULE 2	**Fourier Transforms:** The Fourier Integral-Complex Fourier transform-Inverse transform-Basic properties-Transforms of the derivative and the derivative of the transform. Fourier sine and cosine transforms and inverse-transforms for first and second order derivatives	**14 hrs**
MODULE 3	**Discrete Mathematical structures:** Sets, subsets, power sets Counting techniques Methods of proofs and disproofs, proof by mathematical induction Basic data structures: stacks, queues, graphs, arrays, hash tables, trees Graph properties: Recurrence relations and equations Generating functions	**14 hrs**
MODULE 4	**Complex Analysis:** Complex numbers, the complex plane - conjugate and modulus of a complex number - the modulus-argument form - geometric representation - Equation to circle and line in the complex form.	**12 hrs**

Text Books:

1. Laplace and Fourier Transforms - M. D. Raisinghania, New Delhi, India: S. Chand and Co. Ltd.
2. Graph theory by F Harary
3. Graph theory by Dr. Chandrashekhar
4. Laplace and Fourier Transforms - M. D. Raisinghania, New Delhi, India: S. Chand and Co.

TITLE: DATA STRUCTURE

PAPER CODE: BIoT2.3	CREDITS : 5	TOTAL NO OF HRS: 54

Objectives:

- ✓ To be able to practically implement the data structures like stack, queue, array etc. To understand and implement different searching and sorting techniques.

MODULE 1	Introduction and Overview: Definition, Elementary data organization, Data Structures, data structures operations, Abstract data types, algorithms complexity, time-space tradeoff. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms.	**09hrs**
MODULE 2	Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting String Processing: Definition, Storing Stings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.	**09hrs**
MODULE 3	Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly liked list; Doubly liked list, Header liked list, Circular linked list.	**09 hrs**
MODULE 4	Stacks – Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues – Definition, Array representation of queue, Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on Queues, Applications of queues.	**09 hrs**
MODULE 5	Sorting: Bubble sort, Insertion sort, Selection sort, Searching: Linear Search, Binary search, Multidimensional arrays, Matrices and Sparse matrices.	**09hrs**
MODULE 6	Tree – Definitions, Binary trees, Representing binary trees in memory, Traversing Binary Trees, Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree, Heap Tree.	**09 hrs**

Text Books:

1. Seymour Lipschutz, "Data Structures with C", Schaum'soutLines, Tata McGraw-Hill, 2011.

TITLE: 8051 MICROCONTROLLER

PAPER CODE: BIoT2.4	CREDITS : 4	TOTAL NO OF HRS: 54

Objectives:

This course enables students to understand:

- ✓ Basics of Microprocessor and Microcontroller
- ✓ 8051 Microcontroller architecture and Pin description
- ✓ 8051 Addressing modes and instruction set
- ✓ Design and develop applications using 8051 Assembly language and C program.
- ✓ On-chip peripherals and program using Assembly language and C.

MODULE 1	**Introduction to microcontrollers:** Introduction, Microprocessors and Microcontrollers,. RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture. **The 8051 Architecture:** Introduction, 8051 Microcontroller Hardware, Input/Output Pins, Ports and Circuits External Memory, Counter and Timers, Serial Data Input / Output, Interrupts.	**10hrs**
MODULE 2	**Addressing modes and operations:** Introduction, Addressing modes, External data Moves, Code Memory, Read Only Data Moves / Indexed Addressing mode, PUSH and POP Opcodes, Data exchanges, Example Programs; Byte level logical Operations, Bit level Logical Operations, Rotate and Swap Operations, Example Programs. Arithmetic Operations: Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic, Example Programs. **Jump and Call Instructions:** The JUMP and CALL Program range, Jumps, calls and Subroutines, Interrupts and Returns, More Detail on Interrupts, Example Problems	**12hrs**
MODULE 3	**8051 programming in C**: Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization.	**10 hrs**
MODULE 4	**Timer / counter programming in 8051:** Programming 8051 Timers, Counter Programming, programming timers 0 and 1 in 8051 assembly level and embedded C. **Interrupts programming:** 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Interrupt Priority in the 8051/52, interrupt programming in assembly level	**12 hrs**

TITLE: ANALOG ELECTRONICS- LAB

PAPER CODE: L2.1	CREDITS : 1	NO OF HRS: 3hrs/week

1. Verification of Thevinin's and Maximum power transfer theorem.
2. Series and Parallel resonance circuit- determination of Resonant frequency, Bandwidth and Q-factor.
3. (a) Study of V-I Characteristics of Semiconductor diode.
   (b) Half and Full wave\Bridge wave rectifier with and without shunt capacitance filter.
4. Diode clippers and clampers.
5. Zener regulator-Line and Load regulations.
6. Voltage divider bias-design and load line.
7. (a) Transistor characteristics in CE mode.
   (b) JFET Characteristics.
8. CE amplifier.
9. Tuned Amplifier.
10. Non-inverting and inverting operational amplifier-ac response.
11. Inverting summer, Non-inverting summer and subtractor.
12. First order Active Low-Pass and High Pass filters using OP-AMP-Frequency response.
13. Phase shift oscillator/Wein bridge oscillator.
14. Colpitt's /Hartely oscillator.(Op- amp based)

SEMESTER III

III SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Part 1	Language1	English	4	30	70	100	2
	Language2	Kan/San/Hin/Japanese	4	30	70	100	2
Part 2	BIoT3.1	ARM Microcontroller	4	30	70	100	4
	BIoT3.2	Network Protocols.	4	30	70	100	5
	BIoT3.3	Communication System	4	30	70	100	4
	L3.1	ARM microcontroller lab	3	15	35	50	1
	L3.2	Communication lab	3	15	35	50	1
	Project	Python Programming	4	30	70	100	4
Part 3		Mandatory Paper	1	15	35	50	1
Total Marks and credits			**34**	**225**	**525**	**750**	**24**

	Peripherals: GPIOs, System Configuration Controller, NVIC, ADC, Comparators, GP Timers, USART. Development & Debugging Tools: Software and Hardware tools like Cross Assembler, Compiler, Debugger, Simulator, In-Circuit Emulator (ICE), Logic Analyzer etc.	

Text Books:

1. Joseph Yiu," The Definitive Guide to the ARM Cortex-M3", Second Edition, Elsevier Inc. 2010.
2. Andrew N Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide Designing and Optimizing System Software", Elsevier Publications,2006
3. Steve Furber, "ARM System-on-Chip Architecture", 2nd Edition, Pearson Education, India ISBN: 9788131708408, 8131708403 , 2015

Reference Books:

1. Dr. K.V.K. Prasad, "Embedded / Real-Time Systems: Concepts, Design and Programming Black Book" , New ed (MISL-DT) Paperback – 12 Nov 2003
2. David Seal "ARM Architecture Reference Manual", Addison Wesley, England; Morgan Kaufmann Publishers,2001
3. Ajay Deshmukh, "Microcontroller - Theory & Applications", Tata McGraw Hill, 2005
4. Arnold. S. Berger, "Embedded Systems Design - An introduction to Processes, Tools and Techniques", Easwer Press, 2001
5. Raj Kamal, "Microcontroller - Architecture Programming Interfacing and System Design" 2nd Edition, Pearson Education, 2011
6. Cortex-M series-ARM Reference Manual
7. Cortex-M3 Technical Reference Manual (TRM)
8. STM32L152xx ARM Cortex M3 Microcontroller Reference Manual 5/97
9. ARM Company Ltd. "ARM Architecture Reference Manual– ARM DDI 0100E"
10. ARM v7-M Architecture Reference Manual (ARM v7-M ARM).

	support to the actuator, Initializing the topic content, Subscribing to topics, Receiving the published content, Decoding and parsing content, Adding MQTT support to the controller, Handling events from the sensor, Decoding and parsing sensor values, Subscribing to sensor events, Controlling the actuator, Controlling the LED output, Controlling the alarm output	
MODULE 5	**The XMPP Protocol** XMPP basics, Federating for global scalability, Providing a global identity, Authorizing communication, Sensing online presence, Using XML, Communication patterns, Extending XMPP, Connecting to a server, Provisioning for added security, Adding XMPP support to a thing, Connecting to the XMPP network, Monitoring connection state events, Notifying your friends, Handling HTTP requests over XMPP	**09 hrs**
Text Books: 1. Learning Internet of Things by Peter Waher 2015 Packt Publishing 2. Internet of Things with Python Publisher: Packt Publishing Limited (20 May 2016)		
Reference Books: 1. Designing The Internet Of Things, Wiley, Adrian McEwen.		

	Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Handover Techniques - Overview of Multiple Access Schemes - Satellite Communication	

Text Books:

1. Wayne Tomasi, —Advanced Electronic Communication Systems , 6th Edition, Pearson Education, 2009.

Reference Books:

1. Simon Haykin, —Communication Systems , 4th Edition, John Wiley & Sons, 2004
2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
3. H.Taub, D L Schilling and G Saha, —Principles of Communication , 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, —Modern Analog and Digital Communication Systems , 3rd Edition, Oxford University Press, 2007.
5. Blake, —Electronic Communication Systems , Thomson Delmar Publications, 2002.
6. Martin S.Roden, —Analog and Digital Communication System , 3rd Edition, Prentice Hall of India, 2002.
7. B.Sklar, —Digital Communication Fundamentals and Applications 2nd Edition Pearson Education 2007.

TITLE: COMMUNICATION LAB

PAPER CODE: L3.2	CREDITS : 1	NO OF HRS: 3hrs/week

1. Amplitude Modulator
2. Amplitude demodulator.
3. Pre-Emphasis and De-Emphasis.
4. Automatic Gain Control.
5. Saw-tooth wave generator using IC 555.
6. Voltage controlled oscillator using IC 555.
7. Frequency multiplier using transistor.
8. Frequency Mixer.
9. PAM using transistor.
10. PWM and PPM using IC-555.
11. ASK modulation and demodulation using OP-AMP or transistor
12. FSK modulation using IC-555 or 565.
13. Optical fiber Experiments
14. Communication Kit Experiments
    a. Sampling theorem
    b. QPSK.
    c. BPSK
    d. TDMA
    e. Delta Modulation

TITLE: SENSING AND ACTUATING DEVICES		
PAPER CODE: BIoT4.1	**CREDITS : 4**	**TOTAL NO OF HRS: 54**
Objectives: ✓ Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules ✓ Market forecast for IoT devices with a focus on sensors		
MODULE 1	**TRANSDUCERS** Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Capacitive transducer, Piezo-electric Transducers, Inductive transducer, Differential output transducers and LVDT. Piezoelectric transducer, photoelectric transducer, Photovoltaic transducer, Semiconductor photo devices, Temperature transducers-RTD, Thermocouple. Bolometer and RF power measurement using Bolometer.	**12hrs**
MODULE 2	**SENSORS:** Introduction to Sensors, Limit Switches, International Limit Switches, BERO Sensors, Proximity Sensors (Inductive, Capacitive, Ultrasonic): Theory of Operation , Sensor Family, Photoelectric Sensors Theory of Operation and its Family, Atmospheric Sensors: Pressure and Density Sensors; Pitot-Static, Angle of Attack and Side-Slip, Outside Air Temperature Sensors, Barometric Sensors: Air Speed Sensor, Altitude Sensor, Vertical Speed Sensor. Electro-Mechanical Sensors: Gyroscope, Synchro, Flux Valve/Gate, Magnetic Compass, Gyromagnetic Compass. Sensors applications.	**12hrs**
MODULE 3	**SEVEN GENERATIONS OF IOT SENSORS TO APPEAR** Industrial sensors – Description & Characteristics–First Generation – Description & Characteristics–Advanced Generation – Description & Characteristics–Integrated IoT Sensors – Description & Characteristics–Polytronics Systems – Description & Characteristics–Sensors' Swarm – Description & Characteristics–Printed Electronics – Description & Characteristics–IoT Generation Roadmap	**10 hrs**
MODULE 4	**TECHNOLOGICAL ANALYSIS** Wireless Sensor Structure–Energy Storage Module–Power Management Module–RF Module–Sensing Module	**10 hrs**

TITLE:STATISTICS

PAPER CODE: BIoT4.2	CREDITS : 5	TOTAL NO OF HRS: 54

Objectives:

- ✓ This paper will help students to have a thorough knowledge of descriptive statistics.
- ✓ To understand measures of central tendency and use them to analyze data.
- ✓ This paper will help students to have a thorough knowledge of descriptive basic probability and samplings.

MODULE 1	**Introduction** Population and sample, Types of data – Qualitative, Quantitative, Univariate, Multivariate, Cross sectional, Time, Series, Discrete, Continuous, Primary, Secondary, Scales of measurement – Nominal, Ordinal, Interval, Ratio, Variables and attributes, Organization and presentation of data, Construction of frequency distributions (univariate and bivariate), Presentation of data through diagrams (bar and pie) and graphs (frequency curve, histogram, cumulative frequency curves), Stem and leaf plot.	**10hrs**
MODULE 2	**Correlation and Regression** Linear correlation – Scatter diagram, Product moment correlation coefficient – Properties, Spearman's rank correlation coefficient, Simple regression, Prediction.	**10hrs**
MODULE 3	**Measures of Central Tendency** Measures of location or central tendency – Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean.	**04 hrs**
MODULE 4	**Probability and Random Variables** Introduction to probability, Sample space and events, Axiomatic approach to probability, Addition theorem, Conditional probability. Random variables: Concept of a random variable, Discrete and continuous random variable and their probability functions, Distribution function and its properties, Expectation of a random variable – Mean Variance, Bivariate probability distribution, Marginal and conditional distributions, Covariance, Independence, Conditional expectation and variance, Mean and variance of linear combination of random variables.	**20 hrs**
MODULE 5	**Sampling Methods** Types of sampling – Purposive, Random and mixed samples, Sampling Methods – Simple, Random, Stratified, Cluster, Relative merits and limitations of the different methods.	**10hrs**

TITLE: INTERNET OF THINGS		
PAPER CODE: BIoT4.3	**CREDITS : 4**	**TOTAL NO OF HRS: 54**

Objectives:

- ✓ Assess the genesis and impact of IoT applications, architectures in real world.
- ✓ Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

MODULE 1	What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	**10hrs**
MODULE 2	**IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management	**12hrs**
MODULE 3	**REFERENCE ARCHITECTURE:** IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.	**12 hrs**
MODULE 4	**Sensor connectivity:** Various wired communication protocols recap, IIC (Normal, High speed), SPI (3 wire, 4 wire modes), Single wire, CAN, serial interface. Various wireless communications: High-level overview with pros and cons of Bluetooth, BLE(Bluetooth low energy), Zigbee, Wifi protocols. Voltage level translations. Recap of TTL, CMOS levels. Level shifters to cross connect 1.8v, 3.3v and 5v devices	**10 hrs**
MODULE 5	**Data monitoring& Visualization:** Data visualization basics. Different options for visualization. Local display using different types of LCD/LED displays, display of charts using web interfaces etc.	**14 hrs**

TITLE: IoT LAB		
PAPER CODE: L4.1	**CREDITS : 1**	**NO OF HRS: 3hrs/week**
TEXAS INSTRUMENTS INNOVATIVE LAB		

TITLE: SENSING AND ACTUATING LAB		
PAPER CODE: L4.1	**CREDITS : 1**	**NO OF HRS: 3hrs/week**
TEXAS INSTRUMENTS INNOVATIVE LAB		

TITLE: CLOUD ARCHITECTURE AND COMPUTING

PAPER CODE: BIoT5.1	CREDITS : 5	TOTAL NO OF HRS: 54

Objectives:

- ✓ To understand the differences between traditional deployment and cloud computing
- ✓ To determine whether existing applications to the cloud makes technical and business sense
- ✓ To analyze and compare the long-term costs of cloud services
- ✓ To learn how to build a transactional web application for the cloud or migrate one to it
- ✓ Change your perspective on application scaling in cloud environment for quality metrics

MODULE 1	**CLOUD ARCHITECTURE BASICS** The Cloud -Hype cycle-metaphorical interpretation-cloud architecture standards and interoperability- Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public, private clouds community cloud, role of virtualization in enabling the cloud.	**10hrs**
MODULE 2	**ENDTO END DESIGN** Requirement analysis: strategic alignment and architecture development cycle-strategic impact-Risk impact-financial impact-Business criteria-technical criteria-cloud opportunities –evaluation criteria and weight-End to end design-content delivery networks-capacity planning-security architecture and design	**10hrs**
MODULE 3	**CLOUD APPLICATION ARCHITECTURES** Development environments for service development; Amazon, Azure, Google App-cloud platform in industry	**10 hrs**
MODULE 4	**HOW TO MOVE APPLICATION INTO THE CLOUD** Web Application Design- Machine Image Design-privacy design – Database management	**12 hrs**
MODULE 5	**SPECIALIZED CLOUD ARCHITECTURE** Workload distribution architecture-Dynamic scalability-Cloud bursting-hypervisor clustering-service quality metrics&SLA.	**12 hrs**

Text Books:

1. Reese, G. (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. Sebastopol, CA: O'Reilly Media, Inc. (2009).
2. John Rhoton ,Cloud Computing Explained: Handbook for Enterprise Implementation 2013 edition, 2013, recursive press

TITLE: EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS

PAPER CODE: BIoT5.2	CREDITS : 4	TOTAL NO OF HRS: 54

Objectives:

- ✓ To understand the aspects of Real Time Embedded concepts
- ✓ To learn the Essentials of Open Source RTOS and their usage
- ✓ To select the proper technique to design a Real-Time System
- ✓ To understand VxWorks RTOS and real time application programming with it
- ✓ To build the device driver and kernel internal for Embedded OS and RTOSearn and apply the knowledge of Memory systems

MODULE 1	**EMBEDDED OS INTERNALS** Linux internals: Process Management, File Management, Memory Management, I/O Management. Overview of POSIX APIs, Threads – Creation, Cancellation, POSIX Threads Inter Process Communication – Semaphore, Pipes, FIFO, Shared Memory Kernel: Structure, Kernel Module Programming Schedulers and types of scheduling. Interfacing: Serial, Parallel Interrupt Handling Linux Device Drivers: Character, USB, Block & Network.	**12hrs**
MODULE 2	**OPEN SOURCE RTOS** Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, Differences between General Purpose OS & RTOS, Basic architecture of an RTOS, Scheduling Systems, Inter-process communication, Performance Matric in scheduling models, Interrupt management in RTOS environment, Memory management, File systems, I/O Systems, Advantage and disadvantage of RTOS. POSIX standards, RTOS Issues – Selecting a Real-Time Operating System, RTOS comparative study.	**12hrs**
MODULE 3	**REAL TIME KERNEL BASICS** Converting a normal Linux kernel to real time kernel, Xenomai basics. Overview of Open source RTOS for Embedded systems (Free RTOS/ ChibiosRT) and application development. Real Time Operating Systems: Event based, process based and graph based models, Petrinet models. Real time languages, real time kernel, OS tasks, task states, task scheduling, interrupt processing, clocking, communication and Synchronization. Control blocks, memory requirements and control, kernel services, basic design using RTOS.	**10 hrs**

TITLE: ADVANCED SENSOR NETWORKS

PAPER CODE: BIoT5.3	CREDITS : 5	TOTAL NO OF HRS: 54

Objectives:

- ✓ Understand the Basics of WSN
- ✓ Gain the knowledge on architecture & sensor networks
- ✓ Understanding on various tools & platforms.

MODULE 1	**OVERVIEW OF WIRELESS SENSOR NETWORKS** Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.	**10hrs**
MODULE 2	**ARCHITECTURES** Single-Node Architecture - Hardware Components, Energy Consumption of Sensor .Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.	**12hrs**
MODULE 3	**NETWORKING SENSORS** Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.	**12 hrs**
MODULE 4	**INFRASTRUCTURE ESTABLISHMENT** Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.	**10hrs**
MODULE 5	**SENSOR NETWORK PLATFORMS AND TOOLS** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.	**10 hrs**

Text Books:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

Reference Books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Reference Books:

1. Murtaza Haider, Getting Started with Data Science, IBM Press, 2015
2. Davy Cielen, Introducing Data Science: Big Data, Machine Learning, andMore, Manning, 2016

VI SEMESTER							
Part	**Paper**		**Hours/week**	**Marks**			**Credit**
	Code	**Title**		**IA**	**Exam**	**Total**	
Project/Internship			23	150	350	500	22
Total Marks and credits			**23**	**150**	**350**	**500**	**22**

The National Education Society of Karnataka®

THE NATIONAL COLLEGE

36th B cross, 7th block, Jayanagar, Bangalore-70
(Autonomous Institution, Affiliated to Bangalore University)

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DEPARTMENT OF COMPUTER SCIENCE

B.o.S Meeting Held On 1st June 2019

Scheme CBCS-2015 onwards
Syllabus for 2019-20
III &IV Semester BCA/B.Sc.

THE NATIONAL COLLEGE

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Jayanagar, Bangalore - 560 070.

Website : www.nationalcollegejayanagar.org E-mail : ncjblore@yahoo.com

NAAC ACCREDITED 'A' GRADE

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DEPARTMENT OF COMPUTER SCIENCE

Ref. : .....

Date 1/6/2019

Attendance list of the BOS members present on 1st June2019

Sl.No	Members Name	Address	Signature
1.	**Prof. Shalini.C** Chairperson	Associate Prof. & HOD Computer Science The National College Jayanagar, Bangalore - 70	
2	**Dr. Muralidhara.B.L** University Nominee	Professor, & Coordinator, MCA Programme Bangalore University	01-06-2019
3	**Dr.Shoney Sebastian** Subject Expert	Associate Professor Christ University Bangalore	01/06/2019
4	**Prof.Kottureswara .M** Subject Expert	Assistant Professor Govt. Women's College, Mandya (Affiliated to Mysore University)	
5	**Mr. Amar Thalur** Industrial Representative	Q.A. Lead Pramathi Technologies	
6	**Prof.Vishal.C** Alumni Representative	Assistant Professor. MCA Dept,RVCE Bangalore	01/6/19
7.	**Prof. Asha.T.S** Member	Associate Professor The National College, Jayanagar	
9.	**Prof, Chandana .G .H** Member	Associate Professor The National College, Jayanagar	
10.	**Prof.Sharjeel Ahmed** Member	Associate Professor The National College, Jayanagar	
11.	**Prof.Varadraj.R** Member	Assistant Professor The National College, Jayanagar	
12.	**Prof. Deepika.S** Member	Assistant Professor The National College, Jayanagar	
13.	**Prof. Manjula.S** Member	Assistant Professor The National College, Jayanagar	

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Autonomous

Department of Computer Science

Attendance list of the BOS members present on 1st June2019

Sl.No	Members Name	Address	Signature
1.	**Prof. Shalini.C** Chairperson	Associate Prof. & HOD Computer Science The National College Jayanagar, Bangalore - 70	
2	**Dr. Muralidhara.B.L** University Nominee	Professor, & Coordinator, MCA Programme Bangalore University	01-06-2019
3	**Dr.Shoney Sebastian** Subject Expert	Associate Professor Christ University Bangalore	01/06/19
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5	**Mr. Amar Thalur** Industrial Representative	Q.A. Lead Pramathi Technologies	
6	**Prof.Vishal.C** Alumni Representative	Assistant Professor. MCA Dept,RVCE Bangalore	1/6/19
7.	**Prof. Asha.T.S** Member	Associate Professor The National College, Jayanagar	
9.	**Prof, Chandana .G .H** Member	Associate Professor The National College, Jayanagar	
10.	**Prof.Sharjeel Ahmed** Member	Associate Professor The National College, Jayanagar	
11.	**Prof. Manjula.S** Member	Assistant Professor The National College, Jayanagar	
12.	**Prof.Varadraj.R** Member	Assistant Professor The National College, Jayanagar	
13.	**Prof. Deepika.S** Member	Assistant Professor The National College, Jayanagar	

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AGENDA OF THE B.o.S MEETING TO BE HELD ON 1st June 2019

1) To discuss and approve new core subject **Software Testing** for IV sem. BCA.
2) To discuss and approve new core subject **PYTHON Programming** for III sem.BCA .
3) To discuss the possibility of replacing **C++** with **Java** in III sem. B.Sc.
4) To discuss the possibility of shifting **Business Analytics** from IV sem BCA to III sem BCA.
5) To approve the enhanced syllabus of **DBMS**, **Software Engineering** **Business Analytics** and **Unix (BCA and B.Sc.)**
6) To approve Open Elective subjects syllabus.
7) Any other matter.

CHAIRMAN

DEPARTMENT OF COMPUTER SCIENCE

Proceedings of the B.o.S meeting of B.C.A and B.Sc.(III and IV semesters) held on 1st June 2019 from 11.00 a.m. at The National College, Jayanagar, Bangalore – 70.

1. Replacing the course C++ in III semester B.SC by Java Programming.

2. Introducing Python Programming in III semester BCA and Software Testing in IV semester BCA.

3. Moving Business Analytics from IV semester BCA to III semester BCA.

4. UNIX, Database Management System syllabus were enhanced by adding new topics to them.

5. Software Engineering Syllabus was completely upgraded.

6. Software Testing Syllabus was framed with the help of Industry Expert and Subject Expert.

7. Syllabus for Open Elective "E-Commerce" and "Internet and its Application" was approved.

Title of Papers and Scheme of Study & Examination for BCA (Bachelor of Computer Applications) Under Choice Based Credit System - Semester System (Revised w.e.f. 2014-2015)

Semester	Part	Paper Code	Title of the paper	Hours / Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
I	Part - 1	BCA101T	Indian Language	4	30	70	100	2	24
		BCA102T	English	4	30	70	100	2	
	Part – 2	BCA103T	Programming using C	4	30	70	100	4	
		BCA104T	Computer Organization .	4	30	70	100	4	
		BCA105T	Mathematics	4	30	70	100	4	
		BCA106T	Introduction to Web Technology	4				4	
		BCA107P	C Programming Lab	3	15	35	50	1	
		BCA108P	WebTechnology Lab	3	15	35	50	1	
	Part – 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	
II	Part – 1	BCA201T	Indian Language	4	30	70	100	2	24
		BCA202T	English	4	30	70	100	2	
	Part - 2	BCA203T	Data structures	4	30	70	100	4	
		BCA204T	Java Programming .	4	30	70	100	4	
		BCA205T	Operating System	4	30	70	100	4	
		BCA206T	Mathematics	4	30	70	100	4	
		BCA207P	Data Structures Lab	3	15	35	50	1	
		BCA208P	Java Lab	3	15	35	50	1	
	Part - 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	

I A

UNIT-I 12

Introduction to Electronic Commerce: The meaning, benefits, impact, Classification, application of Electronic Commerce technologies.
Electronic Commerce Business models: meaning of business model

UNIT-II 12

Electronic Data Interchange: conventional trading process, meaning of EDI, building blocks of EDI system, layered architecture, value added networks, benefits and application of EDI
Electronic Commerce: Architectural framework:
Electronic Commerce: Information distribution and messaging: FTP application, Email, WWW server, HTTP, Web Servers implementation

UNIT-III 12

Electronic Commerce : Network infrastructure: LAN, Ethernet LAN, WANs, Internet, TCP/IP reference model, Domain Name systems, Internet industry structure
Electronic Commerce: securing the business on Internet: Vulnerability of information on Internet, security policy, procedures and practices, site security, protecting the network

UNIT-IV 12

Electronic Commerce: securing the business on Internet: transaction security, cryptography, digital signature, email security
Electronic Payment System: Introduction to payment system, Online payment system, prepaid electronic payment systems, requirement metrics of a payment system
Mobile Commerce: Introduction, Framework and models: meaning, benefits, impediments, framework

Text Book:

Bharat Bhaskar, **Electronic Commerce: Framework, Technologies and Applications**, 2nd edition, McGraw Hill company, 2006

Reference Books:

1. David Whiteley, **E-Commerce: Strategy, Technologies and Applications**, Tata McGraw Hill Education Private limited, 2004
2. Ravi Kalakota, Andrew B. Whinston, **Frontiers of Electronic Commerce**, Addison-Wesley Publications, 2000
3. C. S. V. Murthy, **E-commerce: Concepts, Models, Strategies**, Himalaya Publishing House, 2011

BCA 301 T: DATABASE MANAGEMENT SYSTEM

Total Teaching Hours : 52	**No. Of Lecture Hours/Week:04**
Max Marks: 70	**Credit: 04**
Course Objective:	

To provide strong foundation of database concepts and develop skills for the design and to implement a database application using SQL.

Course Outcome:

CO1: Understanding the DBMS terms, concepts, and tools of relational database management systems.

CO2: Understanding database design and logic development for database programming.

CO3: Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph).

UNIT 1	**Teaching Hours :10**

INTRODUCTION

Data, Database, Database management system, Characteristics of the database approach, Database users, Advantages of Using a DBMS and When not to use a DBMS. Data Models, Categories of data models, Schemas, DBMS Architecture and Data Independence, The Three schema architecture, DBMS Languages and Interfaces, Classifications of DBMS

UNIT 2	**Teaching Hours :10**

E-R MODEL AND FILE ORGANIZATIONS

Entity types, Entity Sets, Attributes and Keys. Relationships, Relationship types, Roles and Structural constraints. Weak and strong Entity Types and Drawing E- R Diagrams. Naming conventions and design issues, Preparing E-R diagrams for a problem.
Record storage and primary file organization, heap files, Single Level Ordered Indexes, Primary indexes, Clustering indexes and Secondary indexes

UNIT 3	**Teaching Hours 10**

RELATIONAL MODEL AND NORMALIZATION.

Relation, Integrity constraints - domain, entity and Referential integrity constraints, Basic Relational Algebra operations, select, project and join operations.
Functional dependencies and Normalization for Relational Databases - Normalization concepts, first, second, third normal forms and Boyce-Codd normal form.

UNIT 4	Teaching Hours :10
STUCTURED QUERY LANGAUGE(SQL)	
SQL Basics, SQL data definition and data types, specifying constraints in SQL, Basic queries like INSERT, DELETE ,ALTER and UPDATE statements in SQL, More Complex SQL queries for grouping and built in functions, Joining tables using equi, left, right joins.	
UNIT 5	**Teaching Hours :06**
DATABASE SECURITY	
Introduction to database security issues, discretionary access control based Granting/Revoking of privileges, account level and relation level security, Introduction to statistical Database security.	
UNIT 6	**Teaching Hours :06**
NOSQL DATABASE	
Why NoSQL? The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, A (Mostly) Standard Model, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Aggregate Data Models; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Summarizing Aggregate-Oriented Databases. More Details on Data Models; Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access	
Text Books:	
1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson. 2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill 3. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addision Wesley, 2012	
Reference Text Books:	
1. Database System Concepts, Silberschatz Korth and Sudharshan, 6th Edition, Mc-GrawHill, 2013. 2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.	

3. Introduction to database management system by By Atul Kahate, 1/e, pearson publications
4. Dan Sullivan, "NoSQL For Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN- 13: 978-9332557338)
5. Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press, 2013. (ISBN-13: 978-9351192022)
6. Kristina Chodorow, "Mongodb: The Definitive Guide- Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publications, 2013. (ISBN-13: 978-9351102694)

BCA 302T: SOFTWARE ENGINEERING

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	
Course Objective:	

- To provide the knowledge of software engineering discipline.
- To apply analysis, design and testing principles to software project development.
- Understanding of approaches to verification and validation including static analysis and reviews.

Course Outcome:

On successful completion of this course students will be able to

- Understand and demonstrate basic knowledge in software engineering.
- Identify requirements, analyze and prepare models.
- Apply testing principles on software project and understand the maintenance concepts

UNIT 1	Teaching Hours :12

Software Engineering &Process Models

Nature of software- Defining software, Software Application Domains, Legacy Software , The Changing Nature of Software-WebAPPs, Mobile Applications, Cloud computing, Product Line Software

Software Engineering-The software process, Software Engineering practice – The essence of Practice, General Principles , Software Development Myths.

Process Models:A generic process model – Defining a framework activity, Identifying a Task Set, Process Patterns - Process Assessment and improvement, Prescriptive Process Models – The waterfall Model, Incremental Model, Evolutionary Process Model, Concurrent Models

UNIT 2	Teaching Hours :10
Agile Development	
What is Agility, Agility and cost of Change, Agile Process-Agility principles, The Politics of Agile development, Extremeprogramming, Other Agile process models - Scrum, Dynamic System Development Model, AgileModelling, Agile Unified Process, A Tool set foe Agile process Human Aspects of software engineering-Characteristic of a Software Engineer, The psychology of Software engineer, The Software team,Team Strucures,Agile teams	
UNIT 3	**Teaching Hours :10**
Requirement Engineering	
Requirements Engineering, Establishing the groundwork – Identifying Stakeholders, Recognizing multiple viewpoints, Working toward Collaboration, Asking the first questions-, Eliciting requirements – Collaborative requirement gathering, Quality function Deployment, Usage Scenario Elicitation Work Products, Agile requirement elicitation ,Developing use cases, Building the Analysis model – Elements of the Analysis Model, Analysis pattern ,Agile requirement engineering Negotiating requirements, validating requirements.	
UNIT 4	**Teaching Hours :10**
Design Concepts	
Design with in the context of software engineering, TheDesign Process, Design concepts-abstraction,architesure,patterns,modularity,information hiding, functional independence, refinement, Object oriented design concepts, Design classes. The Design Model-Data design elements, Architectural design elements, interface design elements, component-level design elements, deploymentdesign elements. User Interface design-Golden rules ,user interface analysis and design	

UNIT 5	Teaching Hours :10
Quality Management & Software testing	
Quality Management-What is quality, software quality, software quality delimma, quality and security, Achieving software quality,Quality control,Quality assurance-elements of quality assurance, software reliability Software Testing- A Strategic approach to testing, strategic issues, Test strategies for conventional software, Test strategies for Object Oriented software, Validation testing, White-box testing, Basic path testing, control structure testing, Black-box testing, Object oriented testing methods	
Essential Text Books:	
1. Pressman S Roger,Bruce.R.Maxman, Software Engineering, A Practitioner"s Approach, McGraw Hill, International Editions, 8th edition, 2019.	
Reference Text Books:	
1. Software Engineering- Ian Sommerville, Pearson Education, New Delhi. 2. An Integrated Approach to Software Engineering- PankajJalote, Narosa Publishing House.	

BCA - PYTHON PROGRAMMING (2018Batch)

Total Teaching Hours for Semester:52	No of Lecture Hours/Week:4
Max Marks:70	Credits:4

Course Objectives/Course Description

Learn to program and programming paradigms brought in by Python with a focus on File Handling and Regular Expressions

Learning Outcome

- Appreciate Python Programming
- Paradigm Hands on Regular Expression
- Ability to Text Processing scripts and file handling scripts

Unit-1	Teaching Hours:10

Introduction

History of Python, character set, Identifiers, lines and indentation, multi-line statements, quotation, comments, error messages. Data types, variables and constant: Standard data types: number, string, list, tuples, dictionary, variable: mutable and immutable variables, keywords, constants, literal constant.

Unit-2	Teaching Hours:6

Control Structures and Modules

Conditional statements: if statement, if..else statements, nested if statements

Loops: While statement, for statement, range( ) function, jump statement.

Functions: types of function, working with math, random, built in function. User defined functions

Unit-3	Teaching Hours:10

Strings and List

Strings are immutable, traversing a string. String special operators: concatenation, Replication, membership operator(in), membership operator(not in), comparison operators. String functions and methods: len, capitalize, find, istitle, split, join, swapcase, partition and remaining built in function

List Manipulation: creating lists. Accessing lists: indexing, slicing, traversing. List operations: joining lists, repeating lists, slicing list, comparing lists. List functions and methods: len, append, count, extend, insert, pop, remove, reverse, sort.

Unit-4	Teaching Hours:10
File Handling, Exceptional Handling and	
Writing and Reading Binary Data, Writing and Parsing Text Files, Writing and Parsing XML Files, Random Access Binary Files, Catching and Raising Exceptions, Custom Exceptions.	
Unit-5	**Teaching Hours:10**
Regular Expression	
Regular Expressions: Python's Regular Expression Language : Characters and Character Classes, Quantifiers, Grouping and Capturing, Assertions and Flags, The Regular Expression Module.	
Unit-6	**Teaching Hours:06**
Introduction to GUI Programming	
Dialog-Style programs, Main-Window-Style programs: Creating a main window, creating a custom Dialog.	

Text Books And Reference Books:

[1] Mark Summerfield, Programming in Python 3 A Complete Introduction to the Python Language,Addison-Wesely Reprint 2011

[2] Allen Downey, Think Python, Version 2.0.17, Green Tea Press, Needham, Massachusetts,2012

Essential Reading / Recommended Reading

[1] Barry, Paul, Head First Python,2nd Edition,O Rielly, 2012.

[2] Lutz, Mark, LearningPython, 4th Edition, O Rielly, 2013

BCA : UNIX PROGRAMMING

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	

Course Objective:

- To understand the fundamental design of the unix operating system
- To become fluent with the systems calls provided in the unix environment
- To be able to design and build an application/service over the unix operating system

Course Outcome:

On successful completion of this course, the students will be able to

- Understanding the basic set of commands and utilities in Linux/UNIX systems.
- To learn to develop software for Linux/UNIX systems.
- To learn the C language and get experience programming in C.
- To learn the important Linux/UNIX library functions and system calls.

UNIT 1	Teaching Hours :12

Introduction

Introduction: History, salient features, Unix system architecture, Unix command format, Unix internal and external commands, Directory commands, File related commands, Disk related commands, General utilities,Wild cards
Files and file organizations:Unix files,categories of files,Hidden files ,organizing the unix files,Path names,The dot(.) and Ddouble(..) filenames,Displaying printing comparing files,File Attributes,Ownership of files,Times associated with files,The u mask command,default file permission.

UNIT 2	Teaching Hours :10

File System &Secondary storage management

Unix File System: Boot ,Inode, super and data block, in-core structure, Directories, conversion of pathname to inode, inode to a new file, Disk block allocation. Process Management: Process state and data structures of a Process, User vs, kernel node, context of a Process, background processes, Process scheduling commands, Process terminating and examining commands.
Secondary Storage Management: Formatting, making file system, checking disk space, mountable file system, disk partitioning, file compression. Special Tools and Utilities: Standard I/O, Redirection,Pipe and pipe line-connecting commands Filters, , Processes, signals and Interrupts, storage and compression facilities. Unix system calls and library functions.

UNIT 3	Teaching Hours :10

Shell Programming

Shell Programming: shell types, shell command line processing, shell script features, executing a shell script, shell variables, system and user-defined variables, positional parameters, The $? Command, set command, expr command, shell screen interface, read and echo statement, command substitution, escape sequence characters, shell script arguments, exit , test command, file test, string test, numeric test.

UNIT 4	Teaching Hours :10

Conditional Control Structures

Branching control structures, Loop control structures, the Structure-while, until, for, statements. Jumping Control Structures – break, continue, exit ,performing real arithmetic, The here document, sleep command, Debugging scripts, The script command ,The exec and eval command Stream editor SED

AWK: syntax of AWK statement ,structure of AWK script, operational mechanism, variables, addressing, patterns, operators, control structures, Functions, Simple awk programs, execting AWK script with the shell

UNIT 5	Teaching Hours :10

Unix System Communication

Unix System Communication: The communication process , write, read, wall commands, sending and handling mails,news command,talk command

. System Administration: Roles of a System Administrator, Unix security,The find command File System Maintenance, System Startup and Shutdown, User Management, Backup and Restore, Demons, Domain Name System DNS, Distributed File System.

Text Books:

Text Book:

1. M.G.Venkateshmurthy, "Introduction to UNIX & SHELL Programming", First Edition, Pearson Education, 2004

Reference Text Books:

1. Forouzan,"Unix and Shell Programming", 1st Edition,2008 Cengage Learning India

2.UNIX and Shell Programming, Archana Verma, Firewall Media

BCA - SOFTWARE TESTING

Total Teaching Hours : 52	No. Of Lecture Hours/Week:4
Max Marks:70	Credit 4
Course Objective:	

To study the fundamentals and principles of software testing. To learn few techniques of testing and learn open source testing tool

Learning Outcome

- To understand the significance of testing
- To learn the essentials of testing.
- To Design Test Plan.

UNIT 1: INTRODUCTION TO SOFTWARE TESTING — Teaching Hours :14

Agile Software Development in Scrum:

- Introduction to Agile – Scrum
- Scrum Framework: Roles, Activities, Artefacts
- Roles: Product Owner, Scrum Master, Development team (BA, Dev, QA etc.
- Activities: Backlog Refinement, Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective
- Artefacts: Product Backlog, Sprint Backlog, Product Increment

Testing as an Engineering Activity:

- Software Test Life Cycle, Testing as a Process, Basic Definitions
- Software Testing Principles, Role in a Software Development Organization
- Test Scenarios, Test Case Design Techniques, Test Case Re view, Test Case Prioritization
- Requirement Traceability Matrix
- Origins of Defects, Defect Life Cycle, Defect Repository, Defect Prioritization, Defect Examples, Developer/Tester Support for Developing a Defect Repository, Defect Management Tools

UNIT 2: LEVELS OF TESTING — Teaching Hours :08

- The Need for Levels of Testing: Unit Test and Recording results
- Types of testing
- Smoke Testing – Build verification
- Functional and Non-Functional Testing
- Integration testing, Designing Integration Tests,
- System Testing, Regression Testing , Ad-hoc Testing
- Usability and Accessibility testing.
- Performance testing – Reliability, Stress, Load testing
- Internationalization testing and Globalization testing
- User Acceptance Testing, Alpha and Beta Tests

UNIT 3: TEST MANAGEMENT	Teaching Hours :04

- People and organizational issues in testing
- Organization structures for testing teams
- Testing services - Test Strategy and Planning, Test Estimation, Test Plan Components, Locating Test Items,
- Test Management: Test process - Reporting Test Results, Test Management Tools
- Introducing the test specialist, Skills needed by a test specialist, Building a Testing Group

UNIT 4: REPORTING	Teaching Hours :04

- Test metrics and measurements,
- Static Testing, Types of reviews
- Status Meetings: Daily and Weekly Status meeting
- Project, progress and productivity metrics
- Reports and Control Issues
- Criteria for Test Completion and Reporting Review Results
- Evaluating software quality: Defect prevention and Testing maturity model

UNIT 5: CONTROLLING AND MONITORING	Teaching Hours : 04

- Software test automation
- Skills needed for automation
- Scope of automation
- Design and architecture for automation
- Requirements for a test tool
- Challenges in automation

UNIT 6: AUTOMATION TEST:	Teaching Hours : 18

- Case study and open source testing tools – Selenium
- Automation Framework

Essential Text Books:

1. SrinivasanDesikan and Gopalaswamy Ramesh, Software Testing ' Principles and Practices', Pearson education, 2007.

Reference Text Books:

1. *Agile Software Development with Scrum* by Ken Schwaber, Mike Beedle *2002*
2. BorisBeizer, *SoftwareTestingTechniques, SecondEdition, Dreamtech, 2011.*
3. ElfriedeDustin, *EffectiveSoftwareTesting, FirstEdition, PearsonEducation*, 2010.
4. Renu Rajani, Pradeep Oak, *Software Testing – Effective Methods, Tools and Techniques*,TataMcGraw Hill,2008

BCA : BUSINESS ANALYTICS

Total Teaching Hours : 52	**No. Of Lecture Hours/Week:4**
Max Marks:70	
Course Objective:	

- Understand and critically apply the concepts and methods of business analytics
- Identify, model and solve decision problems in different settings
- Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity

Course Outcome:

- Identify and describe complex business problems in terms of analytical models.
- Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives.
- Translate results of business analytic projects into effective courses of action.

UNIT 1	**Teaching Hours :10**

Business view of Information technology Applications

Business enterprise Organization, Its functions and core business processes, Baldrige Business Excellence Framework, Key purpose of IT in Business, The Connected World: Characteristics of Internet – Ready IT Applications, Enterprise Applications(ERP/CRM) and Bespoke IT Applications, Information Users and Their Requirements. Case Study on Good Food Restaurants Inc.

UNIT 2	**Teaching Hours :12**

Types of Digital Data

Introduction, Getting into "GoodLife" Database, Getting to know structured data-Characteristics, where does it come from? It's so easy with structured data, Hassel free retrieval, and unstructured data-Where does unstructured data come from? A Myth Demystified, How to manage, How to store, How to extract, Solution to storage challenges of unstructured data, How to extract information from stored unstructured data? UIMA: A possible solutions for unstructured data. semi structured data- Where does semi structured data come from? How to manage, How to store, How to extract, modeling semi structured data (The OEM way) ,How to extract information from semi structured data? XML : A Solution for semi structured data management, difference between semi structured and structured data

UNIT 3	Teaching Hours :12
Introduction to OLTP and OLAP	
OLTP-Queries, Advantages, Challenges, the queries that OLTP cannot answer, OLAP-one dimensional, two dimensional, three dimensional data, queries that an OLAP system can process, advantages of an OLAP system, different OLAP architecture, OLTP and OLAP, Data models of OLTP and OLAP,Role of OLAP tools in BI architecture, Should OLAP be performed directly on Operational database? OLAP operations on multidimensional data, Leveraging ERP data using analytics. Practical implementation on Parent-child hierarchies. ROLAP and MOLAP. Implement OLAP explorative data analysis with Pivot Tables. Implement SQL reporting services	
UNIT 4	**Teaching Hours :10**
BI-Definitions and concepts	
BI component frame work-Business layer, operation layer, Implementation Layer.BI for management, process improvement, performance improvement, Customer experience improvement,BI-users,Managing and maintenance of BI systems Managing operations for business continuity.	
UNIT 5	**Teaching Hours :08**
Basics of Data Integration	
Need for Data warehouse, Definition of Data warehouse ,Data Mart, Then an ODS, Goals of Data Warehouse,Constituents a Data warehouse, Data sources, Data mapping, Data staging, Data Integration, Data Integration Technologies, Data qualities, Data profiling.	
Text Books:	
1. Fundamentals of Business Analytics-R.N.Prasad and Seema Acharya 2. Cindi Howson ,Successful Business Intelligence, Unlock the Value of BI & Big Data Hardcover –Second Edition: Import, 1 Nov 2013. 3. Gert H.N. Laursen, JesperThorlund , Business Analytics for Managers: Taking Business Intelligence beyond Reporting Paperback , 26 Sep 2013	
Reference Text Books:	
1. Business Analytics an application focus –R.Ohri 2. R.Sharda, D.Delen & E .Turban,Business Intelligent and Analytical Systems	

Semester	Part	Paper Code	Title of the paper	Hours / Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
III	Part - 1	BCA301T	Indian Language	4	30	70	100	2	25
		BCA302T	English	4	30	70	100	2	
	Part - 2	BCA303T	Database Management System	4	30	70	100	4	
		BCA304T	Python programming	4	30	70	100	4	
		BCA305T	Software Engineering	4	30	70	100	4	
		BCA306T	Business Analytics	4	30	70	100	4	
		BCA307P	Python Programming Lab	3	15	35	50	1	
		BCA308p	RDBMS Lab	3	15	35	50	1	
	Part – 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	
		-	Inter Disciplinary Course	2	15	35	50	1	
IV	Part – 1	BCA401T	Indian Language	4	30	70	100	2	22
		BCA402T	English	4	30	70	100	2	
	Part – 2	BCA403T	C# .Net Programming	4	30	70	100	4	
		BCA404T	Unix Programming	4	30	70	100	4	
		BCA405T	Software Testing	4	30	70	100	4	
		BCA406P	C# .Net Programming Lab	3	15	35	50	1	
		BCA407P	Unix Lab	3	15	35	50	1	
		BCA408P	Mini Project Lab	3	15	35	50	1	
	Part - 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	
		-	Inter Disciplinary Course	2	15	35	50	1	

Semester	Part	Paper Code	Title of the paper	Hours / Week	Marks			Credits	
					IA	Exam	Total	Subject	Semester
V	Part – 2	BCA501T	Analysis & Design of Algorithms	4	30	70	100	4	25
		BCA502T	Artificial Intelligence	4	30	70	100	4	
		BCA503T	Web Programming	4	30	70	100	4	
		BCA504T	Computer Networks	4	30	70	100	4	
		BCA505T	OOAD with UML	4	30	70	100	4	
		BCA506P	Web Programming Lab	3	15	35	50	1	
		BCA507P	ADA Lab	3	15	35	50	1	
		BCA508P	C #.Net Project Lab	3	15	35	50	1	
	Part – 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	
VI	Part - 2	BCA601T	Cloud Computing	4	30	70	100	4	25
		BCA602T	J2EE	4	30	70	100	4	
		BCA603T	Network Security and Cryptography	4	30	70	100	4	
		BCA604T	Data Warehousing & Data Mining	4	30	70	100	4	
		BCA 605T	Content Management System	4	30	70	100	4	
		BCA606P	J2EE Lab	3	15	35	50	1	
		BCA607p	Main Project Lab	3	30	70	100	2	
	Part - 3	-	Value Education	1	15	35	50	1	
		-	Mandatory Course	2	15	35	50	1	

BCA 403T: C# .NET Programming	
Total Teaching Hours : 52	No. Of Lecture Hours/Week: 04
Max Marks:70	Credit :04

Course Objective:

Dot Net is a Microsoft framework that provides a programming guidelines that can be used to develop a wide range of applications——from web to mobile to Windows-based applications. The **.NET** framework can work with several programming languages such as C#, VB.**NET.**

The objective of the course is to enable the student to gain mastery in various advanced Dot net patterns used in Software Industry. On completion of this course, a student will be familiar with C#, ASP.NET, VB.NET and able to develop a web application or windows using dot net technologies. Students will gain the skills and project-based experience needed for entry into web application, windows application

Course Outcome:

- Students are able to develop a dynamic webpage by the use of ASP.NET, C#.
- Students will be able to write a Windows application.
- Insert, Update and delete operations on DBMS table.
- Students will be able to create mini project.
- Use fundamental skills to maintain web server services required to host a website.

UNIT 1- Introduction to C#	Teaching Hours :06

Why C#, Evolution of C#, Characteristics of C#, Applications, Structure of C# program,Name spaces,providing interactive inputs,multiple main methods,C# tokens,literals,variables,data types, value types, reference types, Boxing and Unboxing, for-each statement, Methods in C#, Handling Arrays

UNIT 2 – Classes and Objects	Teaching Hours :10

Defining a class, Adding Variables, Adding Methods, member access modifiers, creating objects, accessing class members, static members and static constructors, constant members and read-only members, properties, indexers, Delegates and Events.

Proceedings of the meeting

- Dr. K.R. Madhura, Chairman and Co-ordinator of the Postgraduate department of Mathematics welcomed the members of Board of Studies to the meeting.
- Chairman briefed about the agenda of the meeting and read out the syllabus.
- A discussion was held on the suitability of adopting the syllabus with modifications.
- The elective papers in fourth semester such as

    1. M403T(D) : Entire and Meromorphic functions
    2. M403T(E) : Special Functions
    3. M403T(F) : Fluid Dynamics of Ocean and Atmosphere
    4. M403T(I) : Riemannian Geometry
    5. M403T(J) : Design and Analysis of Algorithm

    were suggested to be discarded

- Modifications regarding addition of some textbooks and reference books were suggested.
- Modification in number of programs in paper M206P : Scilab practicals for Numerical Analysis-I were suggested.
- Number of teaching hours in papers such as

    1. M201T : Algebra-II
    2. M301T : Linear Algebra
    3. M305T : Numerical Analysis-II
    4. M403T(B) : Magnetohydrodynamics

    were merged and realloted.

- The modifications made with regard to the syllabus and suggestions given were incorporated.
- The chairman thanked all the members and the meeting was concluded.

Madhura K.R

Place: Bangalore
Date: 06 June, 2017

Coordinator
P. G. Department of Mathematics
The National College,
Jayanagar, Bangalore - 5600070

Head
PG Dept of Mathematics
The National College
Autonomous
Jayanagar, Bangalore-560 070

Proceedings of The Board of Studies meeting of Post Graduate Department of Mathematics held at, The National College, Jayanagar, Bangalore-560070 on 12th June 2019.

The following members attended the meeting:

1	Dr. K. R. Madhura	
2	Prof. I. S. Shivakumara	
3	Dr. H. G. Nagaraja	12/06/19
4	Dr. Medha Itagi Huilgol	12/06/19.
5	Dr. Ramesh .B. Kudenatti	
6	Dr. Vasant Kumar Jain.	
7	Ms. Kavya G. M.	
8	Ms. K. Nagamani	
9	Ms. Kalpana .G	
10	Ms. Akhila P. A.	

॥ श्रद्धावान् लभते गतिः ॥

THE NATIONAL COLLEGE

(AUTONOMOUS)

JAYANAGAR, BANGALORE - 70

Department of Post-Graduate Studies & Research in Physics

PROCEEDINGS OF THE MEETING OF THE **BOARD OF STUDIES**

(B.O.S) Held on 15th June 2019

CBCS Scheme

Effective from **2019-2020** Academic Year

Details of the Courses and Credits for the four Semesters

THE NATIONAL COLLEGE (AUTONOMOUS),

JAYANAGAR, BANGALORE - 70

Department of Post-Graduate Studies & Research in Physics

Proceedings of the meeting of The Board of Studies (B.O.S.) in Physics (PG) to finalize the syllabus of III and IV Semester M.Sc., held on June 15th 2019 at 11AM in the Department of PG Physics, The National College, Jayanagar, Bangalore-70.

THEME OF MEETING	**Board Of Studies**
DATE & PLACE	15th June 2019 Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.
CO-ORDINATOR	**Dr.N.G. Pramod** Associate Professor Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.
UNIVERSITY REPRESENTATIVE(s): SUBJECT EXPERT(s)	**Dr. B. Eraiah** Professor Department of Physics, Jnanabarthi Campus, Bangalore University, Bangalore – 56.
BOS EXTERNAL MEMBER(s): OTHER COLLEGE / UNIVERSITIES	**Dr. K.T.Vasudevan** Professor & Head, Department of PG Physics Vijaya College, Bangalore-04.
	Dr. P.Nagaraju Professor & Controller of Examinations, Indian Academy Degree College(Autonomous) Bangalore-43.

	Dr. S. Rajagopal Assistant Professor Department of Physics, School of Sciences, Jain University, Bangalore.
INDUSTRIAL REPRESENTATIVE	**Mr. Siddharth Dubey**
MERITORIOUS ALUMNUS	**Mr. Sumantha H S** Research Scholar, BMS College of Engineering Bangalore
BOS INTERNAL MEMBER(s):	**Dr. B.G. Jagadeesha** Associate Professor Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.
	Mr. Siddalingeshwara B P Assistant Professor Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.
	Mr. Abhiram J Assistant Professor Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.
	Mr. Chethan M Assistant Professor Department of PG studies & Research in Physics, The National College, Jayanagar, Bangalore – 560070.

Members	Signature with date.
In charge Coordinator 1) Dr. N. G. Pramod Associate Professor Department of Physics, Jnanabharathi Campus Bangalore University.	15/6/2019
University Representative 2) Dr. B. Eraiah Professor Department of Physics, Jnanabharathi Campus Bangalore University.	
BOS EXTERNAL MEMBER(s): 3) Dr. P. Nagaraju Professor & Controller of Examinations Indian Academy Degree College (Autonomous) Bangalore	
4) Dr. K.T. Vasudevan Professor & Head, Department of Physics (P.G.) Vijaya College Bangalore	
5) Dr. S. Rajagopal Assistant Professor Department of Physics School of Sciences, Jain University, Bangalore	15/06/2019

MERITORIOUS ALUMNUS & MEMBER

6) Mr. Sumantha H S
Research Scholar, BMSCE.
Bangalore

Sumantha H S
15/06/2019

BOS INTERNAL MEMBER(s):

7) Prof. B.G.Jagadeesha
Associate Professor

15/6/19.

8) Mr. Siddalingeshwara B P
Assistant Professor

16/6/19

9) Mr.Abhiram. J
Assistant Professor

16/6/19.

10) Mr.Chethan. M
Assistant Professor

15/06/2019

Note: Further any minor corrections will be incorporated during due course of the academic year (2019-20).

THE NATIONAL COLLEGE (AUTONOMOUS)

JAYANAGAR, BANGALORE-560070

DEPARTMENT OF POST GRADUATE STUDIES AND RESEARCH IN PHYSICS

Minutes of B.O.S. meet held on 15th June, 2019

- The Coordinator of the PG department extended a cordial welcome to all the members present.
- The Chairman proposed the syllabi of III and IV Semester M.Sc. (Physics) for the approval of BoS.
- The committee consented the amendment of splitting the General Physics Lab into two as General Physics Lab-A and General Physics Lab-B. It was decided to conduct 16 experiments in total (8 in each lab). Each laboratory must have a maximum marks of 50 and 2 credits.
- The board directed to consider a minimum of 5 and maximum of 6 students per batch for General Physics Lab practical examination.
- The group consented the amendment of splitting the computer C Programming- Lab into two as C-Programing Lab: A and C Programing -Lab:B. It was decided to conduct 16 programs in total (8 in each lab).
- The committee directed to consider minimum of 5 and maximum of 6 students per batch for Advanced Physics Lab practical examination.
- The BoS agreed to convert one laboratory in the final year to one project paper with 100 marks and 4 credits.
- It was decided to revoke the previous decision of the elective paper in the 4th semester: Advanced Nuclear Physics.
- It was suggested to mention the year of publication for the books listed as the references for all the papers in the current syllabus.
- The BoS approved for the strength of 5-6 students for one project batch.
- The board approved the proposed list of examiners for theory/practical/project examinations/viva voce/seminar etc.

15/6/2019

The Co-ordinator
Department of Post Graduate
Studies and Research in Physics
The National College (AUTONOMOUS)
Jayanagar, Bangalore-560 070

The National College – Autonomous
Jayanagar, Bangalore – 70

DEPARTMENT OF COMMERCE

Proceedings of the **BOS of M.Com** held on 18th June 2019 from 11.00 a.m. at The National College, Jayanagar, Bangalore – 70.

Members Present:

Dr. Ravikumar R.	Chairman – Board of Studies
Dr. Sarvamangala	PG Studies in Commerce – Bangalore South University Representative
Dr. Muralidhar S	Professor and Head – Department of Commerce – GFGC, Kolar, Bangalore North University
Dr. Satyapal Sharma N K	Associate Professor – VVN Degree College
Dr. S.N. Venkatesh	Principal – Sheshadripuram FGC, Yelahanka
Sri. Madhusudan K	Proprietor, M/S Skanda Enterprises
Prof. Arun Kumar G S	Assistant Professor – The National College
Prof. Nagavalli M N	Assistant Professor – The National College
Prof. Nagamani P L	Assistant Professor – The National College
Prof. Shalini C	Associate Professor – The National College
Prof. Janaki P V	Assistant Professor – The National College
CA. Kiran Kasturi	Assistant Professor – The National College
Dr. Gopala Krishna B N	Assistant Professor – The National College

The chairman welcomed all the members to the meeting.

1) As per the suggestions of previous BOS, the Chairman informed about the changes and incorporated in the curriculum.

2) As per UGC guidelines and NAAC requirements, The Department of Commerce prepared for M.Com course the **Program Educational Objectives (PEO),**

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Program Outcomes (PO) and the Program Specific Outcomes (PSO) in its proper format from academic year 2018 onwards.

3) The Board discussed and resolved to approve the M.Com PEO, PO & PSO as stated above.

4) The Board reviewed and discussed the pattern of end semester examination question paper as mentioned in the regulations and resolved to approve the regulations and scheme under CBCS.

5) From the academic year 2019 onwards, the change in the elective offered is proposed from "Accounting & Taxation" to "Accounting & Finance" keeping in view its objectives and global relevance.

6) From the academic Year 2019 onwards following two subjects "Advanced Direct Taxation-I" & "Advanced Direct Taxation-II" are proposed for clubbing in to one single subject "Advanced Direct Taxation". Also following two subjects " Goods & Services Tax –I" & "Goods & Services Tax – II" are proposed for clubbing in to one single subject. The change is in relation to change in the electives offered.

7) The Board discussed and resolved to approve the change in 3rd Module relating to the subject "Corporate Financial Reporting".

8) From the academic year 2019 onwards, a new subject is proposed with title "Banking Operations And Management" replacing the subject titled "Strategic Management" keeping in view its objectives and subject relevance in III semester.

9) The Board discussed and resolved to approve the change in the subject of "Strategic Management" with "Banking Operations And Management".

10) The chairman readout the syllabus of newly introduced subject titled "Banking Operations And Management" and the board discussed and resolved to approve the syllabus.

11) From the academic year 2019 onwards, a second new subject is proposed with title "Financial Markets and Services" replacing the subject titled "Goods and Services Tax - I". Keeping in view the significance of the same for decision making.

12) The Board discussed and resolved to approve the change in the subject titled "Goods & Services Tax - I" with "Financial Markets and Services"

DEPARTMENT OF COMMERCE

13) The chairman readout the syllabus of newly introduced subject titled "Financial Markets and Services" and the board discussed and resolved to approve the syllabus

14) From the academic year 2019 onwards, a third new subject is proposed with title "Legal environment of business" replacing the subject titled "Sales and Distribution Management" for IV Semester. Keeping in view the significance of the same for decision making.

15) The Board discussed and resolved to approve the change in the subject titled "Sales and Distribution Management" with "Legal environment of business"

16) The chairman readout the syllabus of newly introduced subject titled "Legal environment of business" and the board discussed and suggested some changes to be made in the syllabus. Syllabus is changed accordingly.

17) From the academic year 2019 onwards, a Fourth new subject is proposed with title "Advanced Cost Accounting - II" replacing the subject titled "Advanced Direct Taxation -II" for IV Semester. Keeping in view the significance of the same for decision making.

18) The Board discussed and resolved to approve the change in the subject titled "Advanced Direct Taxation -II" with "Advanced Cost Accounting - II"

19) The chairman readout the syllabus of newly introduced subject titled "Advanced Cost Accounting - II" and the board discussed and suggested few changes in syllabus and books for references and resolved to approve the syllabus

20) The Board discussed and suggested some changes and approved to continue to offer **"Principles & Practices of Income Tax"** as an open elective subject to III semester non-commerce students of other streams of PG.

21) As per the statute of Autonomous, the External Board of Examiners (BOE) should be constituted in the BOS meeting with the consent of the members of the BOS. The list of external BOE was read out for selection and approval. The Board resolved to approve ten members from the panel of BOE.

22) The board resolved to approve the necessary credits to each subject under CBCS system with SGPA and CGPA as per University norms.

23) The Board discussed and resolved to approve the setting of one set of question paper by external faculty handling the subject under PG courses and further

resolved to approve the valuation of the answer scripts, both by Internal Valuer and External Valuer and applying the average of two for declaring result.

24) Finally, the Chairman thanked the members and the members reciprocated the same to him.

SIGNED IN THE PRESENCE OF

(Dr. Ravikumar R)
CHAIRMAN – BOS

CHAIRMAN – BOS PG

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